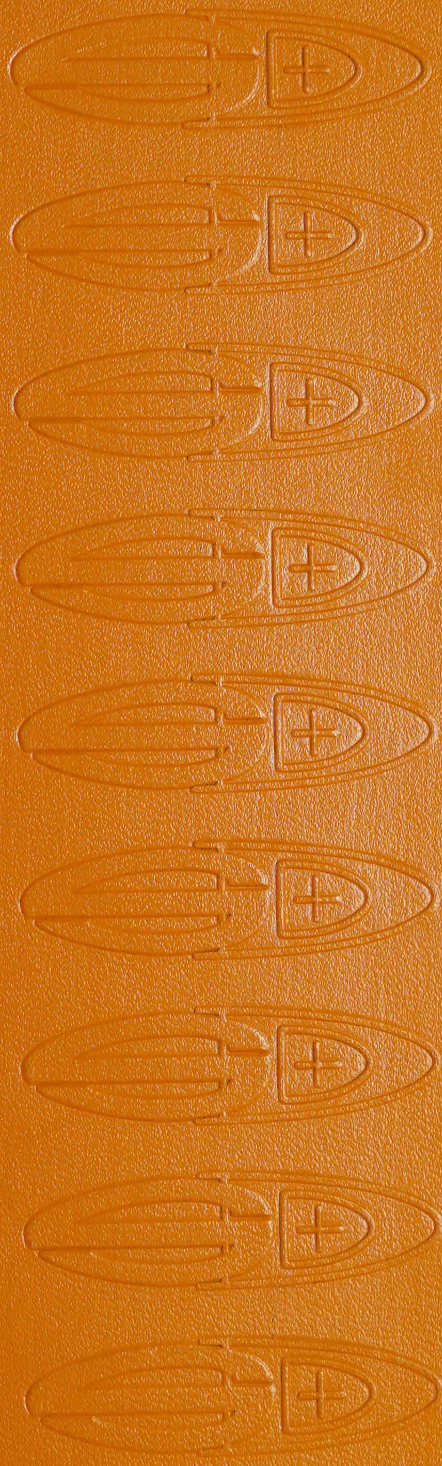

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SYSTRON DONNER

INSTRUCTION MANUAL

MODEL 5103B
DIGITAL PRINTER
SERIAL NO. 507
(D)

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SYSTRON DONNER CORPORATION

DATA PRODUCTS DIVISION
935 Detroit Avenue Concord, California 94518 U.S.A.
Tel: (415) 798-9900 TWX: 910-418-5780 Cable: SYSTRONDONNER
FSCM No. 53947

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SYSTRON DONNER

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Sincerely,

Richard F. Hall

Richard F. Hall
General Manager

Warranty Registration Card

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Company _____ Department _____

Name _____ Title _____

Address _____ Phone (_____) _____

City _____ State _____ Zip _____

PRE-SALE ASSISTANCE
- ☐ Excellent
- ☐ Fair
- ☐ Poor

DELIVERY
- ☐ Early
- ☐ On Time
- ☐ Late

INSTRUMENT PERFORMANCE
- ☐ As Expected
- ☐ Good
- ☐ Defective

SERVICE CONTRACT AFTER WARRANTY? ☐ Yes ☐ No ☐ Check Later

PROVISIONING PARTS REQUIRED? ☐ Yes ☐ No ☐ Check Later

COMMENTS: _____

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Phone: (415) 825-9810
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NOTICE

This manual covers the Model 5103B Digital Printer plus Standard Options. It may, therefore, contain information on features not included in your instrument. If Special Modifications are included they are described in Chapter 7. Options installed in your instrument are checked below.

MODEL 5103B (Group #1, Seven Columns) S/N_____

_____

Options:

- Group #2 Seven Column Expansion (Includes Interconnect Board) ☐
- Group #3 Seven Column Expansion ☐
- Internal Power Supply ☐
- Special Modifications (See Chapter 7) ☐

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CHAPTER 1
GENERAL DESCRIPTION

1.1 BASIC FUNCTION

The basic Model 5103B Digital Printer accepts up to 7-columns of 4-line binary coded inputs and provides a permanent record of these data on ink impression or pressure sensitive paper. Options are available to increase the number of columns to a maximum of 21. Each column is provided with independent decimal point and blanking inputs. These, along with the data inputs, are stored (latched) when a print command input is received. This feature permits a number of printers to be connected to a common set of input bus lines with an individual print command line to each printer serving as the "device select".

Each column can be programmed to print or suppress (blank) zeros whenever they occur in the data or to print a zero only if the next most significant digit is printed. When a decimal point input is supplied, zero suppression in that column is automatically defeated. This permits leading zeros to be suppressed except where they immediately precede the decimal point.

Operation of the printer is asynchronous to a maximum rate of 2.8 lines per second. This is accomplished through use of a Sweep circuit which makes it possible to initiate a printing cycle immediately after receiving a Print Command.

The Model 5103B print mechanism is simple in design and is built with selected quality materials. This, coupled with the use of ball bearings and a brushless dc motor, assures high performance and over 5-million printing cycles without adjustment. Integrated circuits and discrete components are combined for optimum performance.

A paper sensor inhibits printing when the paper supply runs out. Provision has been made to control the printer motor separately from the electronics. The signal and chassis grounds can also be separated simply by removing a jumper.

The printer will accept eighte a (+) or a (-) Print Command input. Complementary (+ and -) Inhibit Outputs are available for use as source "hold off" signals. These are present during the Sweep time which is the time required to actually print data. Complementary Print Cycle outputs are also provided which are present during the Sweep plus Paper Advance times.

A (-) Code input converts the printer to accept input data with inverted logic. A Red Command input initiates printout is red when ink impression is used. Both these inputs are stored in the same manner as data.

A Paper Advance input permits the introduction of extra spaces between lines of data. If this line is held at ground the paper is automatically advanced at a rate of approximately 15 lines per second. A front panel pushbutton switch is provided to ground this line when loading paper.

A Paper-Out output line is provided to indicate when the paper supply is low. When this line goes to ground it blocks operation of the printer. It is grounded internally by operation of the paper sensor. Also, it may be grounded externally to inhibit operation, if desired.

A front panel pushbutton switch is provided which manually commands a printout each time it is pressed.

DC Power (+5 V and +15 V) must be supplied to the basic printer. An internal power supply is available as an option.

1.2 SPECIFICATIONS

Accuracy: Identical to input device.

Data Transfer Time: Approximately 4 µs.

Sweep Time: Less than 300 ms.

Printing Rate: Up to 2.8 lines per second, asynchronous. (2.5 lines per second when printing red.)

Printout: Up to 16 characters per column and up to 7 columns. (Up to 21 columns as an option.)

Line Spacing: 5 lines per inch. 0.20 ±0.01 inch (5.10 ±0.25 mm).

Column Spacing: 0.138 ±0.004 inch (3.5 ±0.1 mm).

Visibility: The last line printed is visible.

Paper: Fanfold packets, or adding machine rolls of ink-impression or pressure-sensitive paper 3-1/2 inches (89 mm) wide. Fanfold packets are 7 inches (17.8 cm) long; rolls can be up to 3-3/4 inches (9.5 cm) in diameter. Up to 3-ply pressure-sensitive paper can be used.

Ribbon: Black, or black and red ribbon 0.5 inches (13 mm) wide by 250 inches (6 m) long on adding machine spools (Walther, Olympis 100, Ruf, Kiengle, etc). Either silk or nylon ribbon may be used. Turn black ribbon over or replace black and red ribbon after printing 5 to 8 rolls or packets of paper.

Environment: Operating; 0° (32°F) to 50°C (122°F) at up to 95% RH.

Storage; -55°C (-69°F) to 85°C (185°F).

Weight: Basic unit 17 lbs (7.7 kg), net; 21 lbs (9.5 kg) with power supply.

Package: 7" high X 8-3/8" wide X 15-1/2" deep.

Power: Basic unit (7 columns) 900 mA @ 5 ±0.5 V and 2 A manimum @ 15 ±1 V. The quiescent current requirement at 15 V (not printing or advancing paper) is approximately 150 mA for the motor. This increases to approximately 500 mA when printing all 7 columns at the maximum rate of 2.8 lines per second, and to 2 A when advancing the paper at the maximum rate of 15 spaces per second. The fully loaded unit (21 columns) requires 2 A @ 5 ±0.5 V.

1.3 INTERFACE

Interface connections are made to 2 rear panel mounted connectors (one 14-pin and one 50-pin) on the basic (7 column) unit. An additional 50-pin connector is provided for each 7 columns or expansion. Pin assignments are shown in Figure 2.1.

The Data, Decimal Point Command ($\overline{\text{D.P.}}$), Blanking ($\overline{\text{Blank}}$), Negative Code ($\overline{\text{-Code}}$) and Red Command inputs are DTL/TTL IC level inputs to Qual Latch chips. "Hi" state +2.4 V to +5 V, "Lo" state 0 V to 0.8 V. Source must sink 3.2 mA. These signals must be present on input lines during Data Transfer Time. Each must be established with 1 μs of the print command and last at least 4 μs.

Data Inputs: Positive level, parallel entry, 4-line ±1-2-4-8 binary code or straight binary. (Printout is octal for straight binary inputs.) Either "Hi" or "Lo" state may represent Logic "1". If "Lo" state is Logic "1" (negative logic) the $\overline{\text{-Code}}$ input must be grounded.

Decimal Point Command (D.P.) Inputs: Positive level, negative true input to each column. Grounding this line commands the printing of a decimal point in the associated column. The decimal point is printed to the right of a numeral printed in the same column.

Blanking ($\overline{\text{Blank}}$) Inputs: Positive level, negative true input to each column. Grounding this line blocks the printing of any character in the associated column.

Negative Code ($\overline{\text{-Code}}$) Input: Positive level, negative true input. Grounding this line converts the printer to accept input data with negative logic.

Red Command Input: Positive level, negative true input. If this line is positive or an open circuit, printout is black. If grounded, printout of associated data is red.

Print Command Inputs: Complementary, positive level inputs ac-coupled to a storage flip-flop. The (+) Print Command triggers the flip-flop on the positive-going transition (2 V minimum change with a maximum rise time of 1 ms). Maximum input voltage is +20 V. Input impedance is 5.6 kΩ to ground. The (-) Print Command input accepts a transition to ground from +5 V, 5 kΩ source or open circuit.

Paper Advance Input: IC level input direct-coupled to a DTL flip-flop. A ground level pulse (minimum 1 μs duration) sets the flip-flop which commands a single paper advance. If held at ground, paper will advance at a rate of approximately 15 spaces per second until released.

Inhibit Outputs: Complementary, buffered, DTL outputs (+5 V behind 6 kΩ, 12 mA sink). These signals are established upon recognition of a print command and released at the end of the Sweep portion of the print cycle (∿300 ms when printing black, ∿350 ms when printing red).

Print Cycle Outputs: Complementary, buffered, DTL outputs (+5 V behind 6 kΩ, 12 mA sink). These signals are established upon recognition of a print command and released at the end of the paper advance (∿350 ms printing black, ∿400 ms printing red).

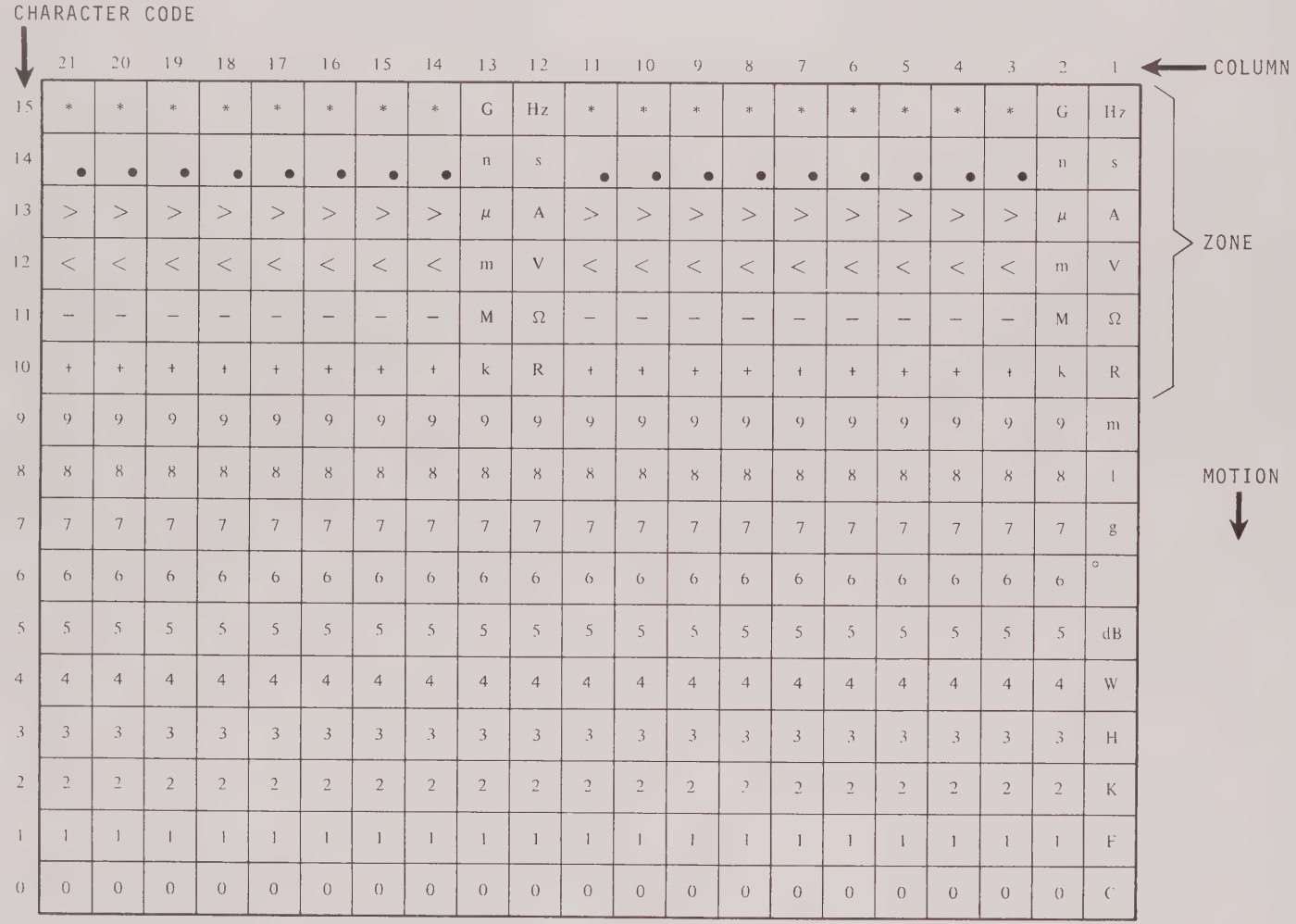


FIGURE 1.1 PRINT DRUM LAYOUT Dwg. #031352-6-2

Paper-Out Output/Input: Contact closure to ground from paper sensor when paper supply is low. When grounded, this line blocks operation of the printer. As an input, this line may be driven from a contact closure or through a transistor to ground.

CHAPTER 2
INSTALLATION

2.1 INITIAL INSPECTION

As soon as the instrument is received, verify that it is intact and as ordered. Inspect the instrument for any damage and if shipping damage is found, refer to the warranty behind the title page of this manual, and to Section 2.1.1 for general packaging instructions.

As soon as possible, the instrument should be installed and given a thorough electrical inspection to ensure compliance with the specifications cited in Section 1.2. Should the instrument fail to meet specifications, immediately contact your Systron-Donner representative.

2.1.1 Storage and Reshipment

Environmental conditions during storage and reshipment should be limited as follows:

Maximum Temperature: 185°F (85°C)

Minimum Temperature: -69°F (-55°C)

To protect your instrument during shipment or storage, use the base packaging methods available. Your Systron-Donner field office can provide materials similar to those used for original factory packing. Contract packing companies can provide dependable packaging on short notice.

General Packaging Instructions:

1) Wrap the instrument in heavy paper or plastic before placing it in the shipping container.
2) If possible, use the original container designed for the instrument. Otherwise, use a strong carton (350 lb/sq.in. bursting strength) or wooden bos to house the instrument.
3) Use plenty of packaging material around all sides of the instrument and protect the front panel with cardboard strips.
4) Seal the package with strong tape or metal bands. Mark with "Delicate Instrument".
5) Refer to the warranty behind the title page of this manual and check with your Systron-Donner field office for shipping instructions. All correspondence should refer to the instrument by model number and full serial number.

2.1.2 Initial Adjustment

No adjustments are required. The Model 5103B is shipped from the factory ready to operate after installation.

2.2 INSTALLATION

To install the Model 5103B connect the necessary power, control and data inputs to PC connector J1 (supplied) as described in Section 2.2.2 on Interface.

2.2.1 Paper and Ribbon Loading

Fanfold Paper Loading:

1) Pull the drawer out until it stops.
2) Place the fanfold paper into the paper tray (not the drawer) so that the red (near-end of paper) warning strip is at the bottom of the tray.
3) Thread the paper by hand between the chrome loading slide and the paper sensor until it reaches the stops. With power applied, hold the paper at the stops and press the PAPER ADVANCE Switch until it feeds through the paper cutting slot in the top part of the front panel. The printer is ready to accept PRINT commands.

Roll Paper Loading: A spindle for the roll paper must be used. It may be ordered as an accessory.

1) Pull the drawer out until it stops.
2) Place the spindle through the hold in the paper roll; then, set it into the grooves in the drawer so that the paper feeds from the bottom of the roll.
3) Thread the paper by hand between the chrome loading slide and the paper sensor until it reaches the stops. With power applied, hold the Paper at the stops and advance it through the paper cutting slot in the top part of the front panel. The printer is ready to accept PRINT commands.

Ribbon Loading:

1) Remove the top half of the front panel and lift out to expose the ribbon assembly.
2) Press the black knobs (with down-pointing arrows) to release ribbon assembly and pull out to the first stop.
3) Thread the ribbon as shown by the red and black threading illustration on the right-hand side of the ribbon assembly.
4) Push the assembly back into the latched position.
5) Replace the top half of the front panel.

2.3 INTERFACE

Interface connections are made through connectors J2 and J3 on the main printer electronics board. See Column and Control Schematic #051228-7-2. Input/Output connections are shown in Figure 2.1. Expansion columns are fed through separate connectors on Optional Column cards which are identical to J2. (Refer to Chapter 6.)

2.3.1 Data Inputs

Data Inputs are in the ±1-2-4-8 binary code. They are connected as shown in Figure 2.1 Input data columns "A" through "G" are printed in right-to-left order with the least significant column ("A") on the right. The active columns are grouped as shown on Dwg. #051097-7-2. Any column can be blanked by grounding the associated Blank line. A decimal point can be printed to the right of a numeral in a column by grounding the associated D.P. line.

Data inputs are positive-level, positive-true (see specifications), unless inverted by grounding the -Code line. These are directly coupled to TTL Quad Latches.

2.3.2 Print Command Inputs

The Print Command input is wired to A1J3, pin 4 or 11 depending on whether it is a positive or negative-going signal. (See Section 1.2.)

2.3.3 Inhibit Outputs

Complementary Inhibit (Hold Off) outputs are provided at A1J3, pins 3 and 10. The (+) output at pin 3 goes positive during the Inhibit time and the (-) output at pin 10 goes to ground. The Inhibit time starts when the Print Command flip-flop is set by the Print Command and terminates when it is reset at the end of Sweep time.

2.3.4 Remote Paper Advance Input

The Remote Paper Advance input at A1J3, pin 1 sets the Paper Advance flip-flop when pulled to ground. This initiates a paper advance pro- a printing cycle is not in progress. The flip-flop is reset at the end of the Print Cycle unless the input is still held at ground at this time. In the latter event, a second advance is initiated by the trailing edge of the Print Cycle signal and subsequent advances will continue at a rate of approximately 15 per second until the Remote Paper Advance input line is released. A minimum 1 μs pulse will initiate a single paper advance provided no printing cycle is in progress. Complementary Print Cycle signals are available at pins 5 and 12.

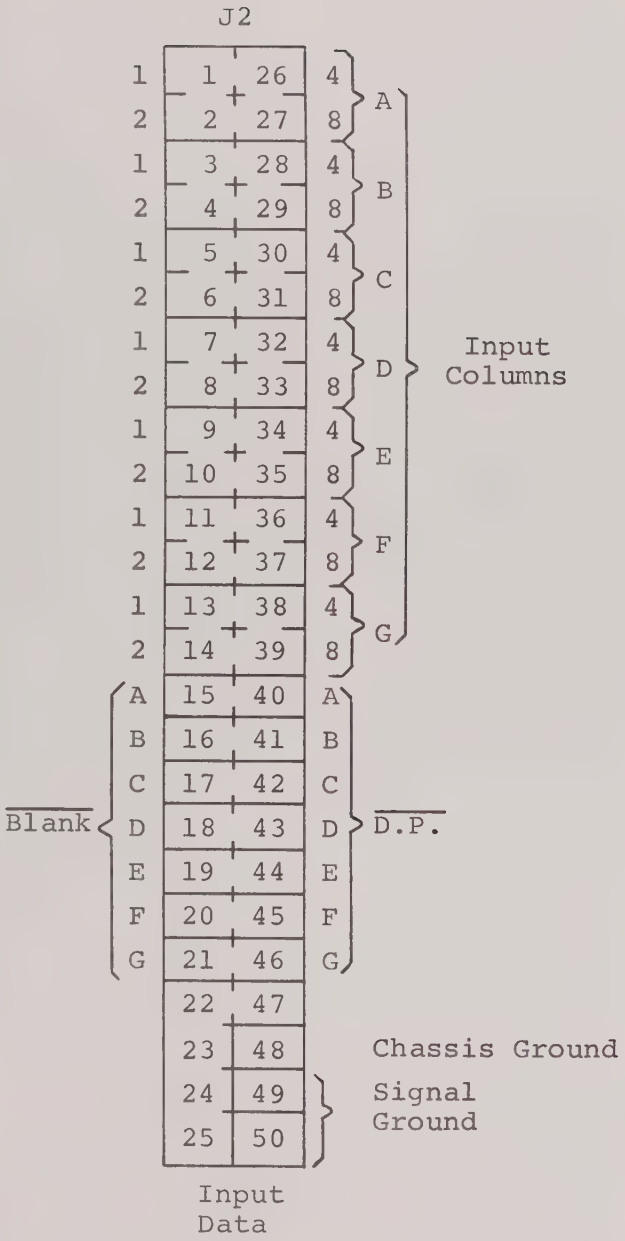
The paper is automatically advanced one space at the end of each printing cycle.

2.3.5 Paper-Out Output

The Paper-Out signal at A1J3, pin 8 goes to ground when the paper supply runs out. The printer is automatically inhibited from printing at this time.

2.3.6 Power and Ground Connections

The +5 V power and associated signal ground are connected to A1J3, pins 13 and 14, respectively. The +15 V motor and coil power, and associated return are connected to A1J3, pins 6 and 7, respectively. Jumpers are provided on the A1 board connecting signal ground to



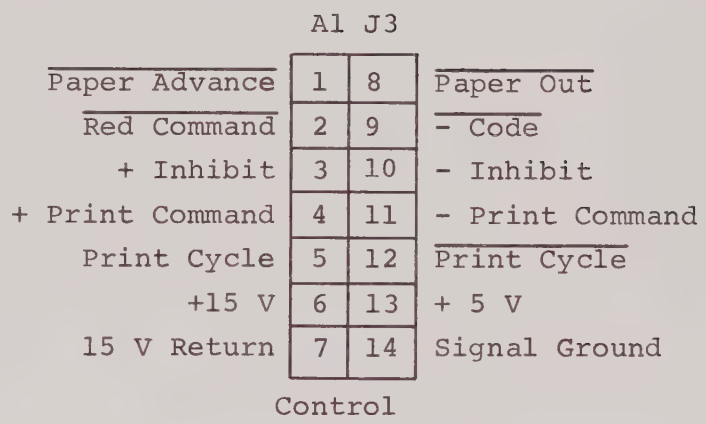

A1 J3
Paper Advance 1 8 Paper Out
Red Command 2 9 - Code
+ Inhibit 3 10 - Inhibit
+ Print Command 4 11 - Print Command
Print Cycle 5 12 Print Cycle
+15 V 6 13 + 5 V
15 V Return 7 14 Signal Ground
Control

FIGURE 2.1
INPUT CONNECTORS

chassis ground and signal ground to the 15 V return. Additional jumpers connect the printer motor to +15 V and associated return. These jumpers can be removed to separate the grounds.

2.3.7 Red Command

The $\overline{\text{Red Command}}$ input to A1J3, pin 2 initiates printout in red if pulled to ground at the time of the Print Command. The Red Command is stored in the same manner as data.

2.4 PROGRAMMING

2.4.1 Zero Suppression

Jumpers are provided on the electronics board(s) for each column circuit to program zero suppression. These are labeled W1 through W7 for columns A through G, respectively, Figure 2.1. If a jumper is installed in the "0" location (normal location for column A as shipped) zeros are printed in the associated column whenever they occur in the data. If a jumper is removed, zeros are suppressed (not printed) except when a decimal point is commanded in the associated column. If a jumper is installed in the "CON SUP" (Conditional Suppression) location, zeros are printed only if the next more significant digit is printed or a decimal point is commanded in the associated column (normal jumper placement for columns B through G). Thus, with conditional suppression, leading zeros are suppressed except when they immediately precede the decimal point. Data inputs must be wired to columns A, B, C, etc. in ascending order of significance for proper operation in this mode.

2.4.2 Column Drive Patching

Print Columns are numbered from right to left on the Print Drum as shown in Figure 1.1. The print column drive coils are wired to a pin assembly which terminates the input column drive patchcords. Any input column may be patched to drive any print column. (See Block Diagram #051097-7-2 in Chapter 5.)

CHAPTER 3
OPERATION

3.1 GENERAL

The operating controls on the basic Model 5103B are located on the front panel. These are described below.

The steps necessary to bring the unit to a fully operational condition are to make the necessary power and signal connections, turn the POWER Switch to the ON position (up) and load paper into the Print Mechanism.

3.2 CONTROLS

Front and Rear panel control functions for the Model 5103B are described in this section.

1)	POWER Switch: (Two-position toggle Switch)	Controls power to the printer whether supplied externally or from the optional internal supply.
2)	Manual PRINT Switch: (Momentary pushbutton Switch)	Initiates a print cycle when pressed, producing a single printout of the data present on the input lines. The paper is advanced one space at the end of the print cycle.
3)	PAPER Advance Switch: (Momentary pushbutton Siwtch)	Initiates a paper advance when pressed provided a print cycle is not in progress. If held down, produces paper advances at a rate of approximately 15 lines per second.

CHAPTER 4
MAINTENANCE AND CALIBRATION

4.1 FACTORY SERVICE

When the instrument requires service, the nearest Systron-Donner representative should be contacted. He can provide field service or arrange for factory returns, when necessary. Address all inquiries on operation or applications to your nearest sales representative; or, Sales Manager:

SYSTRON-DONNER CORPORATION
DATA PRODUCTS DIVISION
935 Detroit Avenue
Concord, California 94518
Phone: (415) 798-9900
TWX: 910-481-5780
Cable: SYSTRONDONNER

Specify both model and complete serial number is all correspondence.

4.2 ROUTINE MAINTENANCE

A regular program for maintenance and inspection every five to six months is recommended for this unit. As part of these regular procedures, the instrument should be checked in the following manner:

1) Disconnect ac power and remove the top and bottom covers.
2) Make a thorough visual inspection of all wiring and cables. Check for frayed, loose or burned wires.
3) Check the physical integrity of all components. Look for burned or cracked components, loose solder connections, leakage of insulation compounds, and general physical damage. When a printed-circuit board contains integrated-circuit packages, ensure that all packages are firmly mounted. Never unnecessarily remove and replace a package.
4) Check all front panel switches and controls for loose or broken terminals, loose or sticking shafts, etc.
5) If the internal panel surfaces and components have an excessive amount of dust deposited on them, use a soft brush and low-pressure stream of air to remove the foreign material.

CAUTION

Do not clean P.C. boards or small internal components with a stiff brush or solvents, since damage to the circuits may result. A high-powered vacuum cleaner device should not be used on small internal components.

6) Wipe the external surfaces of the instrument with a soft damp cloth to remove dirt, fingerprints and other foreigh materials.
7) Replace the top and bottom covers and reconnect ac power.

6) Wipe the external surfaces of the instrument with a soft damp cloth to remove dirt, fingerprints and other foreign materials.

7) Replace the top and bottom covers and reconnect ac power.

4.3 PRINTED-CIRCUIT BOARD REPAIR

When replacing integrated circuits or other electronic components soldered to printed-circuit boards, the procedures indicated below must be followed or damage to the board may result:

1) Determine by troubleshooting techniques, which integrated circuit or discrete component(s) has failed.

2) Remove the defective component(s) from the board by cutting the pins or leads with a small diagonal clipping tool. (Always remove and replace the entire component).

3) Apply heat (40-50 W soldering iron) sparingly to each of the cut pins or leads and remove from the board; clean the hole(s) with a toothpick or solder suction tool.

4) Form the tinned leads of the replacement part and insert in the printed-circuit holes; solder, then trim leads to extend 1/16-inch beyond the back surface of the board. (Use only 63-37 solder with maximum 1/16-inch diameter).

CAUTION

Always trim semiconductor leads only after soldered installation is complete. This procedure greatly lessens the possibility of component failure due to shock-wave damage caused by the trimming tool.

5) When soldering semiconductor devices and all small components be sure to use a heat sink tool or long-nosed plier connected to the component lead(s) while each is being soldered. Allow the soldered connection to cool before removing the heat sink.

6) Clean all dirt and solder-flux from the printed-circuit traces by liberal application of isopropyl alcohol or freon-type solvents.

CHAPTER 5
FUNCTIONAL DESCRIPTION

5.1 GENERAL

The Model 5103B is one of a class of printers called "Flying Printers",in which the print drum carrying the character font rotates continuously. Printing is accomplished by tripping a print hammer which impacts ribbon and paper against a raised character on the drum at a precisely controlled time. Timing is derived from the print mechanism which generates a pair of pulse trains,which together,identify the characters as they come under the print hammers.

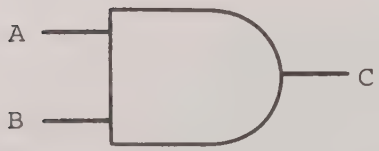
The printer electronics converts these timing signals into a Character Code which is continuously compared with the data on the input lines. When coincidence is detected,the associated print hammer driver circuit is armed and the selected character will be printed,provided a Data Strobe signal is present.

The Data Strobe signals are a group of 16 pulses, one for each of the 16 characters in the drum font. They are derived from the timing signals and are gated when a Print Command is received and recognized.

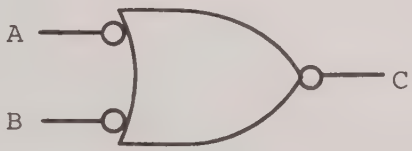
Above operation is described in detail in the following sections. Standard options are described in Chapter 6. In the following discussion, when citing a sub-element of a multi-element integrated circuit, the IC output terminal of the element in question is used to identify the element. For example: U39-3 identifies the gate with output pin 3 in quad gate chip U39. Flip-flops formed from two gates are identified by citing the reference designation of the chip followed by the output pin numbers of the two gates. For example: U39-6,11 identifies the flip-flop formed from gates U39-6 and U39-11. The Q output (pin 6) is given first.

The logic symbols and functions used in the Model 5103B are described on the following pages.

AND Gate



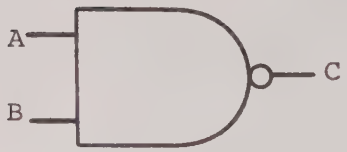
INVERTED NOR Gate



A	B	C
0	0	0
0	1	0
1	0	0
1	1	1

The AND Gate and INVERTED NOR Gate have the same truth table.

NAND Gate



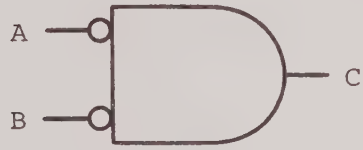
INVERTED OR Gate

A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

The NAND Gate and INVERTED OR Gate have the same truth table.

NOR Gate

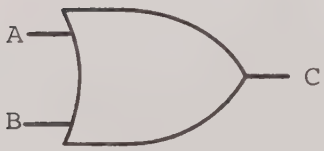
INVERTED AND Gate



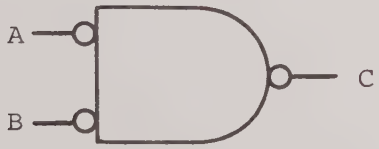
A	B	C
0	0	1
0	1	0
1	0	0
1	1	0

The NOR Gate and INVERTED AND Gate have the same truth table.

OR Gate



INVERTED NAND Gate



A	B	C
0	0	0
0	1	1
1	0	1
1	1	1

The OR Gate and INVERTED NAND Gate have the same truth table.

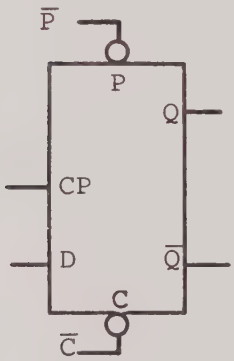
EXCLUSIVE OR

A	B	C
0	0	0
0	1	1
1	0	1
1	1	0

EXCLUSIVE NOR

A	B	C
0	0	1
0	1	0
1	0	0
1	1	1

D-TYPE Flip-Flop



1) Q assumes the state of the D input on the positive transition of the clock (CP) input.
2) The D input is locked out when the clock input is positive.
3) P and C override all other inputs.
4) If $\overline{P}$ and $\overline{C}$ are both at Logic 0, the Q and $\overline{Q}$ outputs are both at Logic 1.
5) At a set condition, Q is Logic 1. At a clear condition, Q is a Logic 0.

In some configurations it is possible to perform the AND and OR function simply by tying the outputs of certain gates together. These functions are called DOT AND and DOT OR functions. The nature of the signals fed to the "DOT" determines whether the function is AND or OR. When several "DOTS" are present on a single line, the AND or OR symbol is used only once.

DOT AND

DOT OR

Logic 0 or Logic 1 demotes internal equipment logic levels. Logic "0" or Logic "1" demotes the logic levels of received or supplied data. Logic signals, when referred to in the text have the first letter capitalized. Equipment controls, when referred to in the text are capitalized.

5.2 OPERATION

5.2.1 Control Circuits (A1, P.C. Board Assembly)

The two timing signals which control printer operation are derived from magnetic position sensors in the printer mechanism. One signal, called "Drum Timing", consists of a pair of pulses synchronized with each of the 16 character positions on the drum. These 16 pulse pairs form a train of 32 pulses for each revolution of the drum. The other signal, called "Drum Reset", consists of a single pulse per revolution which coincides with a Drum Timing pulse associated with the first character in the font. These two pulse trains are shown on lines 1 and 2, respectively, of Timing Diagram Figure 5.1.

Referring to Sheet 1 of Schematic #51228-7-2 and Block Diagram #51097-7-2, the Drum Timing and Reset signals are fed through pins 18 and 36, respectively, of connector P2 to terminals 18 and 36 on the main electronics board. Pulses are present on these lines as long as the printer motor is turning.

NOTE

The brushless dc motor in the printer mechanism is connected through Jumpers C and D on the electronics board to the +15 volt supply through the power switch. It is turned on when this supply and switch are turned on.

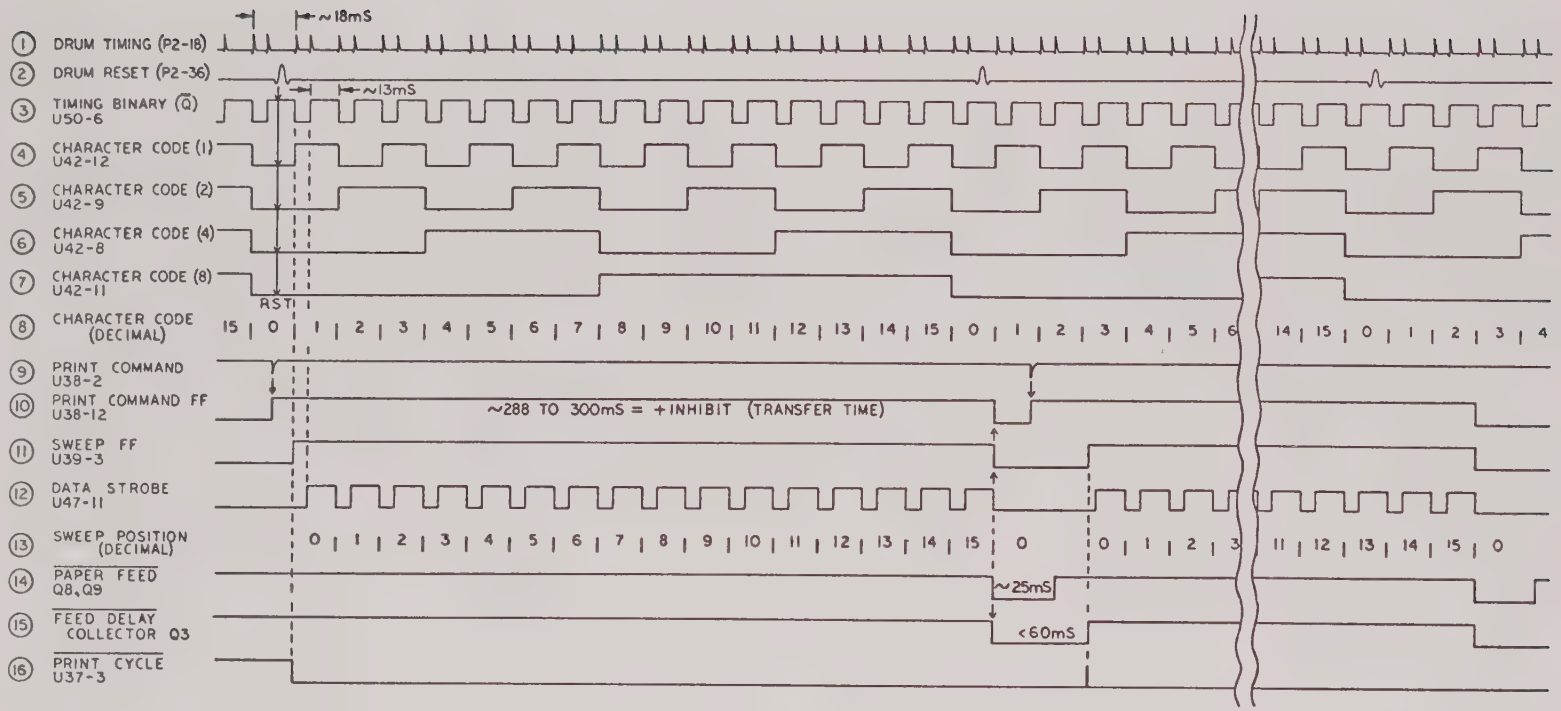

~18mS
~13mS
1 DRUM TIMING (P2-18)
2 DRUM RESET (P2-36)
3 TIMING BINARY (Q̄) U50-6
4 CHARACTER CODE (1) U42-12
5 CHARACTER CODE (2) U42-9
6 CHARACTER CODE (4) U42-8
7 CHARACTER CODE (8) U42-11
RST
8 CHARACTER CODE (DECIMAL)
15 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 0 1 2 3 4 5 6 14 15 0 1 2 3 4
9 PRINT COMMAND U38-2
10 PRINT COMMAND FF U38-12
~288 TO 300mS = +INHIBIT (TRANSFER TIME)
11 SWEEP FF U39-3
12 DATA STROBE U47-11
13 SWEEP POSITION (DECIMAL)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 0 0 1 2 3 11 12 13 14 15 0
14 PAPER FEED Q8,Q9
~25mS
15 FEED DELAY COLLECTOR Q3
<60mS
16 PRINT CYCLE U37-3

FIGURE 5.1 TIMING DIAGRAM MODEL 5103B #C51102-7-1

The Drum Timing pulses are fed to a squaring circuit consisting of Transistor Q6, Inverter U49-8 and associated resistors and capacitors R26, R27, R28, C11 and C21. This circuit amplifies and sharpens the input pulses while rejecting low-amplitude noise. The output is fed to the Clock (CP) input of D-type flip-flop U50 which is wired as a Binary (Divide-by-2) Counter.

The Drum Reset pulses, which are emitted from a higher source impedance, are filtered by integrating circuit R32, C13 before being fed to the squaring circuit formed from Transistor Q7, Inverter U49-4 and the associated passive elements R29, R30, R31 and C12. Complementary, conditioned outputs are supplied from this circuit. The inverted output from the collector of Q7 is fed to the Clear ($\overline{C}$) input of Binary U50. The prime output, called "Zero Reset", from U49-4,is fed to the Reset inputs of Binary (Divide-by-16) Counter U42. This counter generates the 4-bit Character Code mentioned previously and is, accordingly, called the "Character Counter".

The input to the Character Counter is the $\overline{Q}$ output from pin 6 of Binary U50. This signal is also fed to AND gate U45-6 where it is gated to form the Strobe signals. It is shown on line 3 of the Timing Diagram. The 1-2-4-8 outputs from the Character Counter are shown on lines 4, 5, 6 and 7, respectively. The phasing of the $\overline{Q}$ signal from U50-6 is established by the inverted Reset signal to the Clear input.

The $\overline{Q}$ output is forced to the Logic 1 state at the beginning of each character font. At the same time, the Character Counter is reset to 0-0-0-0. Note that once synchronization has been established, the Reset pulses are redundant since the two counters will already be in the correct states when these pulses occur.

The Character Code assumes 16 distinct states corresponding to the 16 characters in the font. These are identified in decimal form on line 8 of the Timing Diagram. The corresponding characters in each column of the drum are shown on the Print Drum Layout, Figure 1.1. The column drive connections are shown on the Block Diagram #51097-7. The Character Code is fed to the Column Circuits (see Section 5.2.2).

The Data Strobe signal consists of a train of 16 "$\overline{Q}$" pulses (U50-6) which emanate from AND gate U45-6 when this gate is opened in response to a Print Command. It is inverted by U49-2 and again by buffer U47-11 before being fed to the column coil drive circuits. The positive excursions of the Data Strobe signal determine the time intervals during which the print hammer coils are to be energized to print each of the 16 characters in the font. It is shown on line 12 of the Timing Diagram. A typical Print Command as seen by the Print Command flip-flop U38-12, U39-8 is shown on line 9.

When a Print Command is received, either as a positive transition through A1J3 pin 4 to Transistor Q1, or as a transition to ground

at A1J3 pin 11, the Print Command flip-flop is set by the differentiated pulse through C1. The output at U38-12 goes positive. This signal is buffered by U38-11 and fed to A1J3-3 as the +Inhibit signal. It is inverted by U40-2 and fed to A1J3-10 as the -Inhibit.

One or the other of the complementary Inhibit signals may be used by the Data Source to inhibit operation until printout is complete. The Print Command flip-flop output from U38-12 (same as +Inhibit) is shown on line 10 of the Timing Diagram. This output is fed through C18 to the Store one-shot U44-6, U40-8 which commands storage of all Data, D.P. and Blanking inputs, in addition to the Red Command and -Code signals. (The Store output from U40-8 is inverted by parallel buffers U40-10, U47-10 and again by the individual inverters driving each Quad Latch chip in the column circuits. See Sheet 2 of the Schematic.) It is also fed to two-input AND gate U37-6. Assuming that there is no printing cycle in progress, the other input to U37-6 is also positive and the output goes positive at a slightly delayed rate due to capacitor C5. This output is fed to three-input NAND gate U38-6. One of the other two inputs to this gate is from Paper Advance flip-flop U39-6,11. This input is positive assuming that no Remote Paper Advance is being commanded. The third input is the Q output from Binary U50-5. This signal is the inverse of the $\overline{Q}$ signal on line 3 of the Timing Diagram. It goes positive when the $\overline{Q}$ signal is at ground, opening gate U38-6 only during these periods. Thus, despite the fact that the Print Command input is asynchronous with respect to the Timing signals, the output from U38-6 goes to ground setting Sweep flip-flop U39-3 only during ground excursions of the $\overline{Q}$ signal. The output from U39-3 goes positive opening gate U45-6 and the first and subsequent positive excursions of the resultant Data Strobe signal are each of standard length. The output from U38-8 goes to ground removing the reset from U46 (see below) and establishing a ground condition on the Print Cycle output from U37-3. This closes gate U37-6 removing the set input from the Sweep flip-flop.

The Data Strobe signals are fed to Binary (Divide-by-16) Counter U46. This counter, called the Sweep Counter, counts the ground transitions of the Data Strobe signal. It starts counting from a zero reset state, having been clamped in this state by the U38-8 output from the Sweep flip-flop when this flip-flop was in the reset state prior to the advent of the Print Command. The 16 distinct states of the Sweep Counter are shown in decimal form on line 13 of the Timing Diagram.

The "8" bit output (pin 11) from the Sweep Counter is ac-coupled through C7 and U45-8 to the Feed Delay (U48-11, Q3) and Paper Advance (U48-8, Q4) one-shots which are both fired when this output goes to ground at the end of the Sweep time (lines 11, 14 and 15 on the Timing Diagram).

The Feed Delay output from Q3 goes to ground for approximately 60 ms. It resets the Print Command and Sweep flip-flops on the leading edge and maintains the Print Cycle output from U37-3 at ground for the additional 60 ms.

The Paper Advance output from Q4 goes to ground for approximately 25 ms. It is fed two places:

1) Through U49-12 to paper-feed-coil drive transistors Q8, Q9 which are turned on,energizing the Paper Feed solenoid in the Printer Mechanism.

2) Through U48-3 to ribbon-feed-coil drive transistors Q10, Q11 which energize the Ribbon Feed solenoid. The ribbon-feed shifts the ribbon to red and back to black,advancing the ribbon. The paper-feed advances the paper when released. (The ribbon mechanism does not lock in red when both solenoids are energized and released simultaneously). The paper is advanced during the remaining Feed Delay time.

This completes one printing cycle (black printout),consisting of a line of data followed by a paper advance and ribbon feed. The data are strobed starting at any character position in the font, thus, permitting each print cycle to start with a minimum of delay. The inhibit signals are removed when the Print Command flip-flop is reset at the end of the Sweep time. The purpose of the Feed Delay is to provide time for the paper to advance before permitting a new printing cycle to start. If a new Print Command occurs during the Sweep time it is ignored. If it occurs during the Feed Delay time, the Inhibits are reimposed, the Print Command is stored, a new Store pulse is generated and the next printing cycle is initiated when the Print Cycle signal from U37-3 returns positive.

The signal from U48-11, which is the complement of the signal from Q3, is fed as an ac reset input (through C4) to Paper Advance flip-flop U39-6, 11. This flip-flop could have been set at any time after the Sweep flip-flop was set without interferring with the printing cycle. (The ground condition of the Print Cycle output from U37-3 holds NAND gate U41-8 closed preventing the Paper Advance one-shot U48-8, Q4 from being fired.) If it were set by a pulse which is removed before the end of the Print Cycle time, it would be reset on the trailing edge of the U48-11 signal and only the one paper advance, initiated by the Sweep Counter, would occur (Capacitor C17 delays the opening of gate U41-8). If it is desired to have more than one space between lines, it is necessary to pulse (set) the Paper Advance flip-flop either after the current print cycle time or prior to the next print cycle. This can be done prior to the printing cycle by ac coupling the -Print Command to the Paper Advance input. (The effect of the Print Command in starting a printing cycle is delayed by C5). It can be done after a printing cycle by using the trailing edge of the Print Cycle signal to fire a one-shot which is fed to the input.

In either approach the output from U39-11 closes gate U38-6. The output from U39-6 opens NAND gate U41-8 feeding differentiated pulses from U42-9 through U41-8 and U45-8 to the Feed Delay and Paper Advance one-shots thus initiating the events described above.

If the input to the Paper Advance flip-flop is removed before the end of the Feed Delay time it will be reset when the output from U48-11 returns to ground. If the input is held at ground beyond the end of the Feed Delay time, a new paper advance will be initiated when the next U42-9 pulse occurs approximately 70 ms later.

When printing red, the above events are altered in the following manner: If the Red Command input to A1J3-2 is pulled to groung at the time the Print Command is generated, this signal is stored and inverted by U35-11 and fed to U45-11 along with the Store signal from one-shot U44-6, U40-8. The output from U45-11 is fed to U41-6 along with the Print signal from U38-12 and the Print Cycle signal from U37-3. All three of these signals must be positive to fire Ribbon Shift one-shot U48-6, Q5. This will be the case provided there is no printing cycle in progress.

When the Ribbon Shift one-shot fires (for approximately 50 ms) the output from U48-6 goes positive, is inverted by U40-12 which clamps the output from U37-6 at ground, thus, preventing the start of the printing cycle until the end of the Ribbon Shift time. The output from Q5 is fed through U48-3 to Q10, Q11 energizing the Ribbon Feed solenoid. The ribbon mechanism shifts to red and latches. The Ribbon Shift one-shot times out, the clamp (Hold) on U37-6 is removed and the printing cycle is initiated with printout in red. The ribbon mechanism is restored to the black state at the end of the cycle when both solenoids are again energized.

5.2.2 Column Circuits (A1, P.C. Board Assembly)

The Character Code from Exclusive OR gates U43 is fed through buffers U36 to Comparator circuits shown on Sheet 2 of Schematic #51228-7-2. Here,the code is continuously compared with the Data stored in Quad Latch chips. Referring to circuit "A" which is typical of the up to seven Comparator circuits on board A1, the outputs of the four Exclusive OR gates on U2 are all in the Logic 0 state only when each of the stored Input Data bits from U1 are equal to the corresponding bits in the Character Code. When this occurs the DOT AND outputs from Inverted AND gates U3-3 and U3-11 go positive and remain positive until the Character Code changes. This establishes one of three inputs to three-input NAND gate U4-6. The other two inputs are the Data Strobe signal from U47-11 and the Zero Suppression output from U4-12.

The Zero Suppression signal is positive unless the stored data input is zero and the printout of this zero is suppressed. This is determined by three-input NAND gate U4-12. Jumper W1 is used to program zero suppression. If it is connected to position "0" (as shown) the control input to U4-12 is grounded and zeros are printed in this column whenever they occur in the data. If it is opened or removed, zeros will be suppressed (not printed) except when a decimal point is commanded. When this occurs the input to U4-12

is grounded by U3-6 output. If the jumper is connected to the "CON SUP." (Conditional Suppression) terminal, zeros will be printed only if the next more significant digit is printed.

NOTE

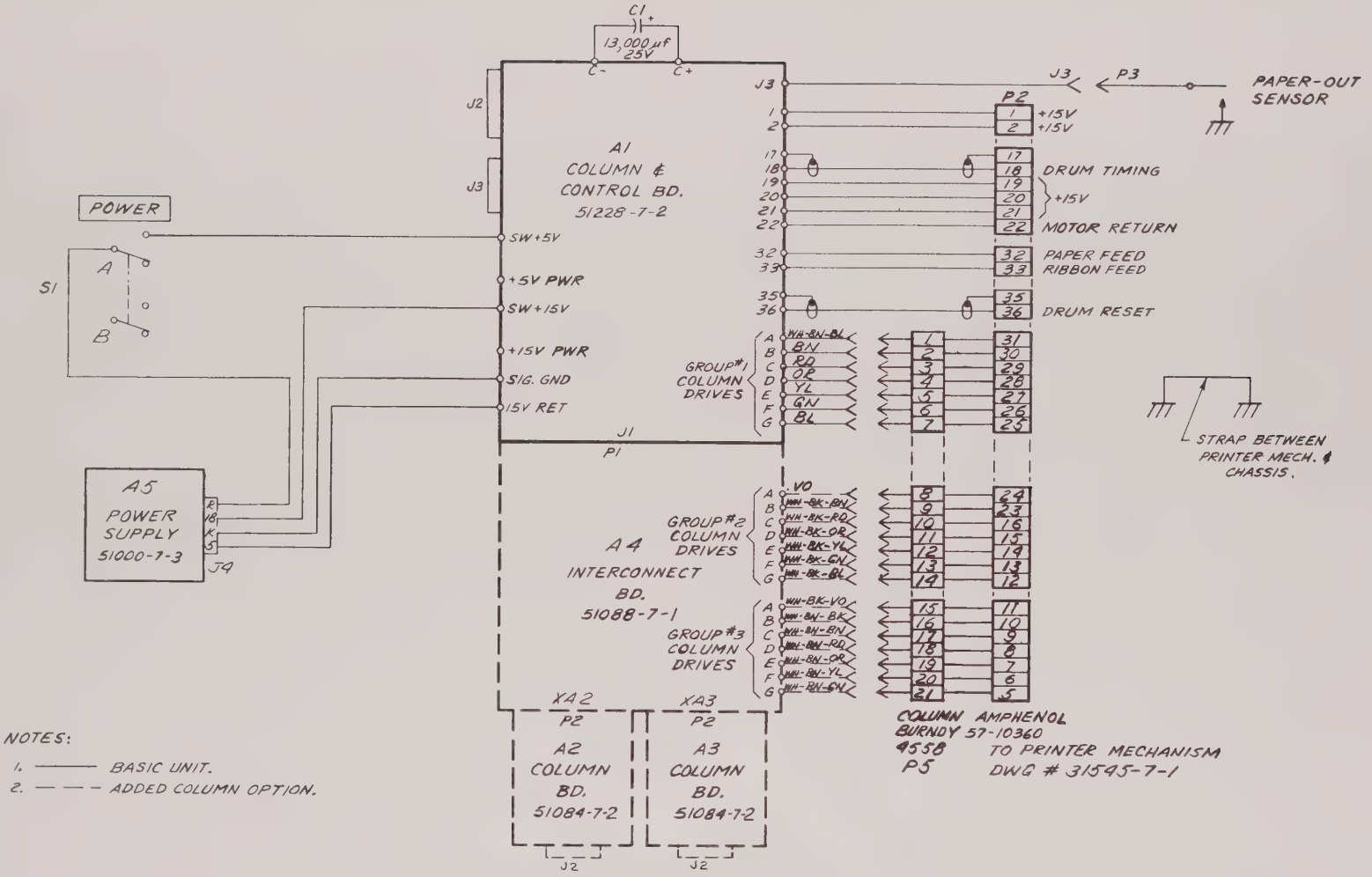
The discussion of zero suppression and floating decimal point insertion presupposes that the column circuit in question is wired to a column on the print drum which has a zero and a decimal point in the font. In addition, for conditional suppression to function properly, data inputs must be wired to the printer in the proper order; i.e. to columns A, B, C, etc. in ascending order of significance.

Zeros are suppressed when the output from U4-12 goes to ground. This depends on the control inputs, as described above, and on the "Zero Bus" from U47-3 and Comparator output (U3-3, 11) going positive at the same time. The Zero Bus goes positive whenever the Character Code is at zero. It is decoded by U44-3, 11 and inverted twice by U49-6 and Buffer U47-3 before being fed to the column circuits. (See Sheet 1 of Schematic #51228-7-2.)

The floating decimal point inputs ($\overline{\text{D.P.}}$) are on individual lines to each column circuit. Referring to circuit "A" the $\overline{\text{D.P.}}$ input from J3-40 is stored and inverted by latch U5-1. If the input is grounded, the output from U5-1 goes positive when the Store one-shot is fired by the print command. This prevents the suppression of a zero (if present) through U3-6 and opens Gate U4-6 to a D.P. Strobe from U47-4. The D.P. Strobe is generated by Gates U41-12, U44-3, U45-3 and Buffer U47-4. The gates decode position 14 in the Character Code (location of the D.P. on the drum) to AND it with the Data Strobe from U49-2. The output from U41-12 is inverted by Buffer U47-4 before being fed to the column circuits.

The decimal point is printed to the right of the numeral in the associated column. Gate U4-6 output goes to ground energizing Q12 through U3-8 provided the Blank signal from U5-14 is at ground.

The column blanking inputs ($\overline{\text{Blank}}$) are also on individual lines to each column circuit. In the case of column circuit "A", the $\overline{\text{Blank}}$ input from J3-15 is stored and inverted by Latch U5-14. When this input is grounded,U5-14 output goes positive when the Store one-shot is fired,closing gate U3-6 and preventing any character being printed in this column.

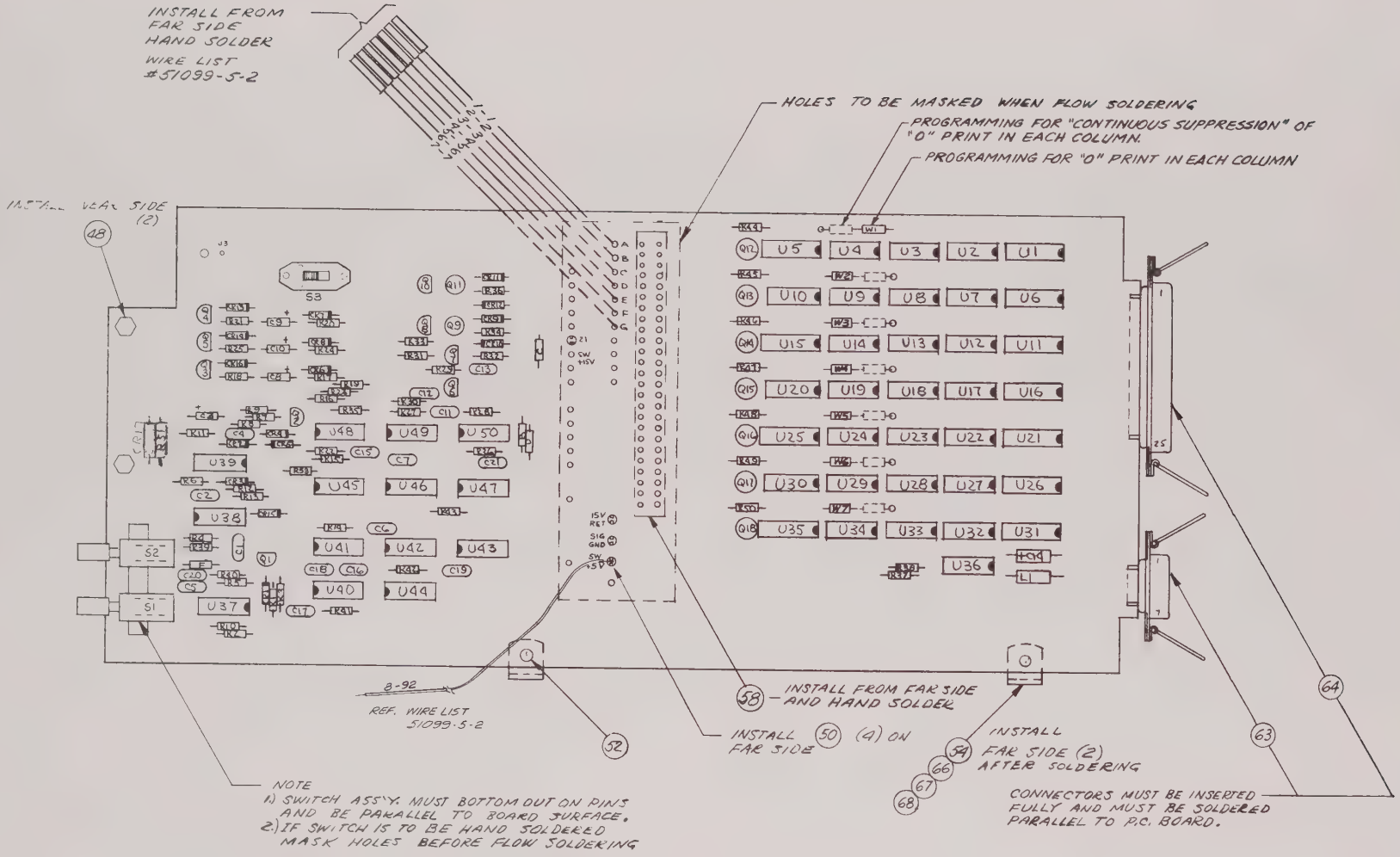


MODEL 5103B BLOCK DIAGRAM #051097-7-2 REV D

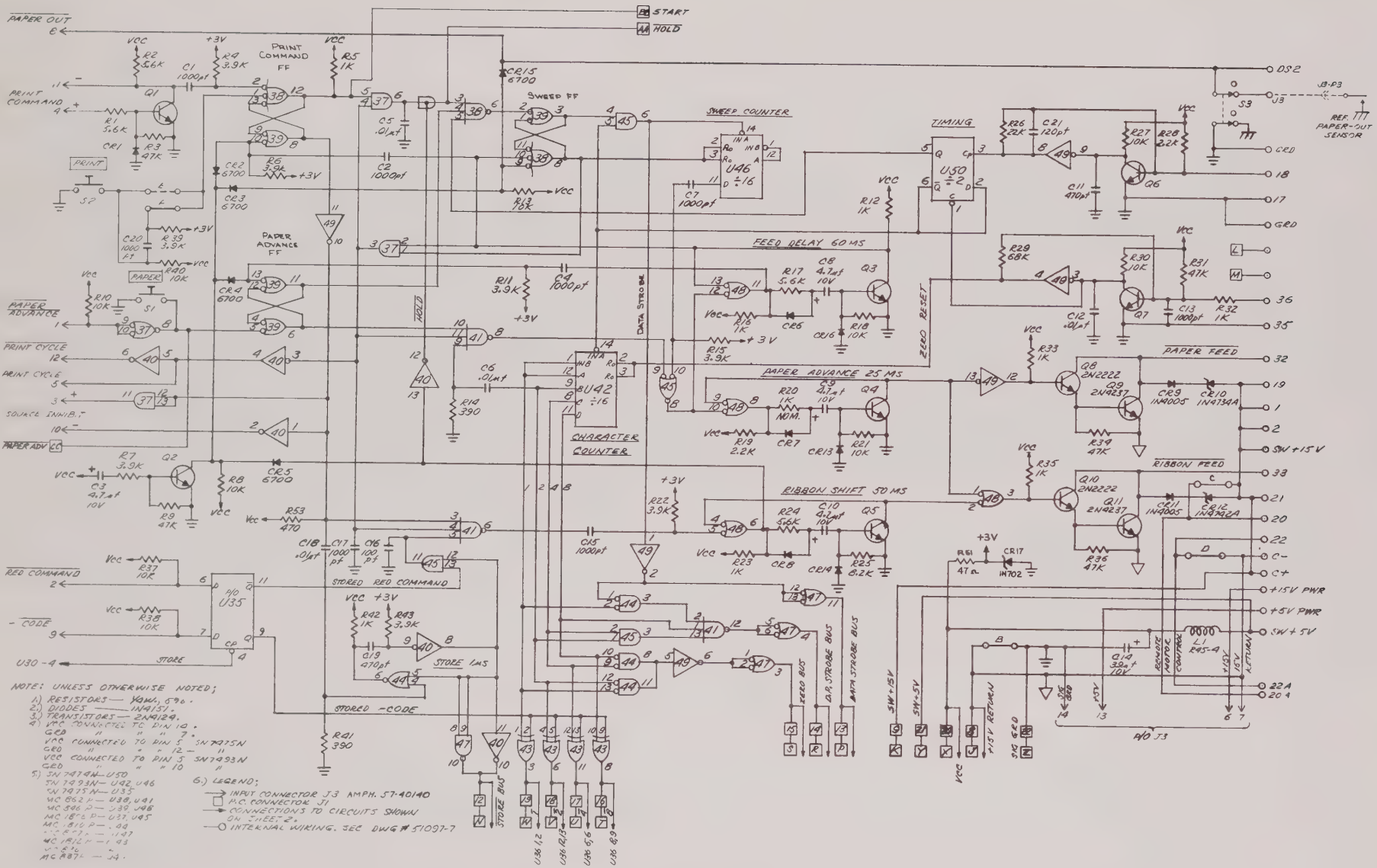
PARTS LIST

FINAL ASSEMBLY #051097-7-2 REV E

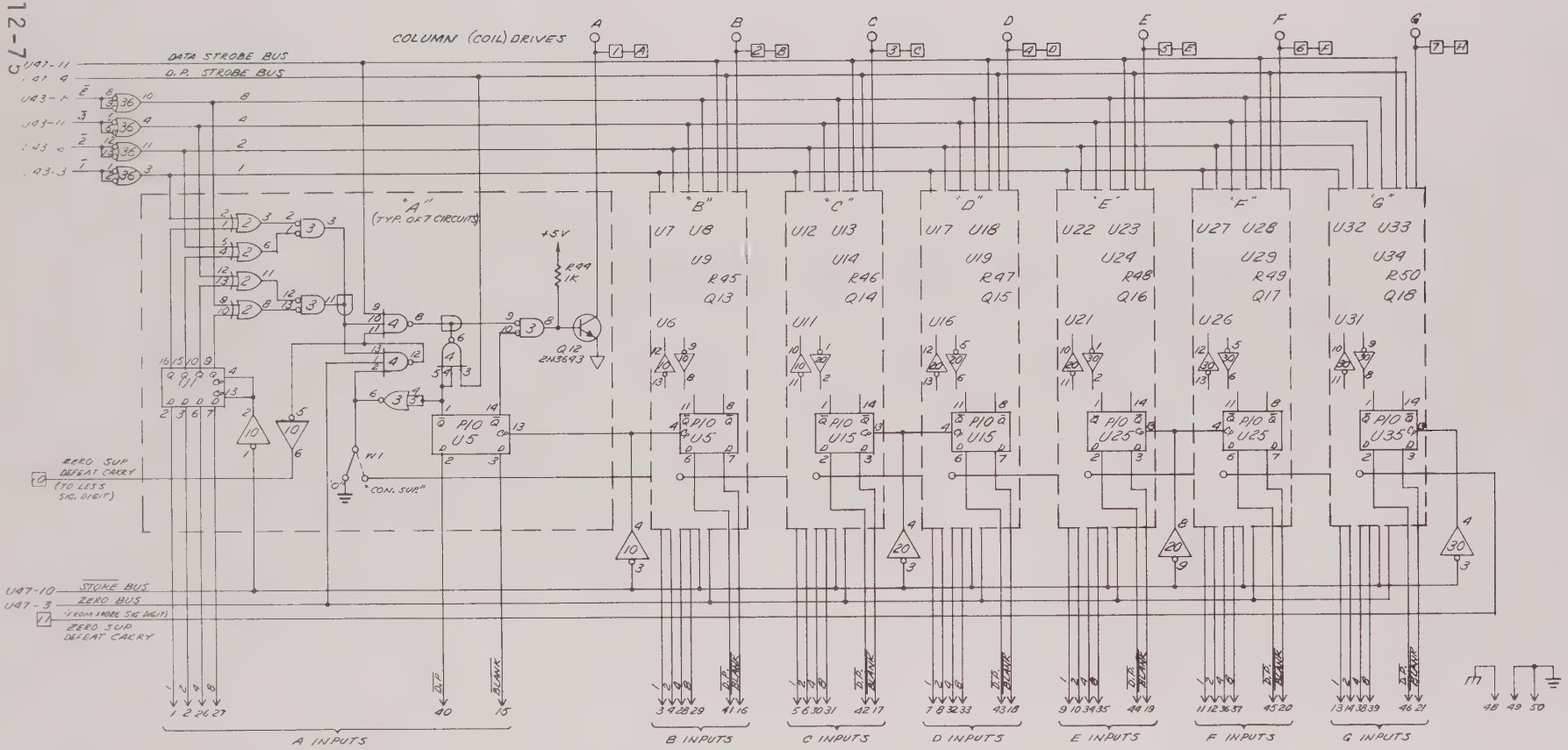
REF.	DESCRIPTION	SD PART NO.
	Assembly	051097-4-2
	Assembly, Power Supply	051000-4-3
	Assembly, 7 Column Control	051228-4-2
	Schematic, Block Diagram	051097-7-2
	Case	051236-1-1
	Chassis	051101-1-1
	Paper Tray	041458-1-1
	Support, Drawer Guide	031432-1-1
	Panel, Bottom	051229-1-1
	Panel Bracket, Left	41784-1-1
	Panel Bracket, Right	051230-1-1
C1	Capacitor, 13,000 µf, 25 V	100279
	Rubber Feet	100612
	Clamp, Cable 7/16"	103029
	Guide	100957
	Grommet	100963
	Spacer	100962
	Clamp, 1-3/8 dia.	100956
	Quick Disconnect	101232
	Ground Strap Wire List	061481
	Switch, DPDT	102354
	Receptacle & Nut	100970
	Clamp, Cable	100716


INSTALL FROM FAR SIDE HAND SOLDER
WIRE LIST #51099-5-2
HOLES TO BE MASKED WHEN FLOW SOLDERING
PROGRAMMING FOR "CONTINUOUS SUPPRESSION" OF "0" PRINT IN EACH COLUMN.
PROGRAMMING FOR "0" PRINT IN EACH COLUMN
INSTALL NEAR SIDE (2)
48
S3
S2
S1
U1 U2 U3 U4 U5
U6 U7 U8 U9 U10
U11 U12 U13 U14 U15
U16 U17 U18 U19 U20
U21 U22 U23 U24 U25
U26 U27 U28 U29 U30
U31 U32 U33 U34 U35
U36 U37 U38 U39 U40
U41 U42 U43 U44 U45
U46 U47 U48 U49 U50
W1 W2 W3 W4 W5 W6 W7
J1 J2 J3 J4 J5 J6 J7
8-92
REF. WIRE LIST 51099-5-2
58 INSTALL FROM FAR SIDE AND HAND SOLDER
INSTALL 50 (4) ON FAR SIDE
52
54 INSTALL FAR SIDE (2) AFTER SOLDERING
63
64
66
67
68
CONNECTORS MUST BE INSERTED FULLY AND MUST BE SOLDERED PARALLEL TO P.C. BOARD.
NOTE
1) SWITCH ASS'Y. MUST BOTTOM OUT ON PINS AND BE PARALLEL TO BOARD SURFACE.
2) IF SWITCH IS TO BE HAND SOLDERED MASK HOLES BEFORE FLOW SOLDERING

A1, COLUMN & CONTROL BOARD ASSEMBLY #051228-4-2 REV E



A1, COLUMN & CONTROL BOARD SCHEMATIC #051228-7-2 REV F (Sheet 1 of 2)



NOTES: UNLESS OTHERWISE NOTED;

1) a. ZERO SUPPRESSION PROGRAMMING. JUMPER (W1) IS NORMALLY CONNECTED TO THE GROUND PAD "0" AS SHOWN. IN THIS STATE, ZEROS ARE PRINTED.
   b. TO SUPPRESS ZEROS AT ALL TIMES, LIFT THE JUMPER FROM THE GRD. PAD.
   c. TO MAKE THE PRINTING OF ZEROS CONDITIONAL ON WHETHER THE NEXT MORE SIGNIFICANT DIGIT IS PRINTED, LIFT THE JUMPER FROM THE GRD. PAD AND SOLDER TO THE "CON SUP" PAD
2) VCC CONNECTED TO PIN 14 GRD " " " 7 VDC CONNECTED TO PIN 5 SN7475N. GRD " " " 12 "

3) MC862P — U4, 9, 14, 19, 24, 29, 34.
   MC836P — U10, 20, 30
   SN7475N — U1, 5, 6, 11, 15, 16, 21, 25, 26, 31, 35
   MC857P — U36
   MC1812P — U2, 7, 12, 17, 22, 27, 32
   MC1810P — U3, 8, 13, 18, 23, 28, 33.

4) LEGEND;
   → EDGE CONNECTOR J2 AMPH. 57-40500
   —○ INTERNAL WIRING. SEE DWG #
   —□ P.C. CONNECTOR J1.

A1, COLUMN & CONTROL BOARD SCHEMATIC #051228-7-2 REV F (Sheet 2 of 2)

PARTS LIST

A1, COLUMN & CONTROL BOARD #051228-7-2 REV K

REF.	DESCRIPTION	SD PART NO.
	Assembly	051228-4-2
	Schematic	051228-7-2
C1,2,4,7,13,15,17, 20	Capacitor, 1000 pF, Mica	100243
C3,8-10	Capacitor, 4.7 µF, 10 V, Tant	100205
C5,6,12,18	Capacitor, .01 µF, 500 V, Disc	100075
C11,19	Capacitor, 470 pF, 500 V, Mica	10022101
C14	Capacitor, 39 µF, 10 V, Tant	100183
C16	Capacitor, 100 pF, 500 V, Mica	10017301
C21	Capacitor, 120 pF, 500 V, Mica	100223
CR1,6-8,13,14,16	Diode, 1N4151	100385
CR2-5,15	Diode, 6700	006700
CR9,11	Diode, 1N4005	100413
CR10	Diode, 1N4734A	100421
CR12	Diode, 1N4742A	100407
CR17	Diode, IN702, 3.2V Zener	100381
J1	Connector, 252-25-30-012	101239
J2	Connector, Amp 57-40500	101156
J3	Connector, Amp 57-40140	101180
L1	Inductor, R45-4	101313
Q1-7	Transistor, 2N4124	101377
Q8,10	Transistor, 2N2222	101347
Q9-11	Transistor, 2N4237	101399
Q12-18	Transistor, 2N3643	101358
R1,2,17,24	Resistor, 5.6 k 5%, ¼ W, CC	101584
R3,9,31,34,36	Resistor, 47 k 5%, ¼ W, CC	101574
R4,6,7,11,15,22, 39,43	Resistor, 3.9 k 5%, ¼ W, CC	101601
R5,12,16,20,23,32, 33,35,42,44,45,46, 47,48,49,50	Resistor, 1 k 5%, ¼ W, CC	101569
R8,10,13,18,21,27 30-37,38,40	Resistor, 10 k 5%, ¼ W, CC	101570
R14,41	Resistor, 390 Ω 5%, ¼ W, CC	101592
R25	Resistor, 8.2 k 5%, ¼ W, CC	101595
R26	Resistor, 22 k 5%, ¼ W, CC	101572
R19,28	Resistor, 2.2 k 5%, ¼ W, CC	101562
R29	Resistor, 68 k 5%, ¼ W, CC	101597
R51	Resistor, 47 Ω 5%, ¼ W, CC	101560
R53	Resistor, 470 Ω 5%, ¼ W, CC	101625
S3	Switch, Slide DPDT	102328
U1,5,6,11,15,16,21 25,26,31,35	Integrated Circuit, SN7475N	19710

PARTS LIST

A1, COLUMN & CONTROL BOARD #051228-7-2 (Cont'd)

REF.	DESCRIPTION	SD PART NO.
U2,7,12,17,22,27, 32,43	Integrated Circuit, MC1812P	25736
U3,8,13,18,23,28, 33,44	Integrated Circuit, MC1810P	25735
U4,9,14,19,24,29, 34,38,41	Integrated Circuit, MC862P	19719
U10,20,30,40	Integrated Circuit, MC836P	25704
U36,47	Integrated Circuit, MC857P	25753
U49	Integrated Circuit, MC837P	25728
U50	Integrated Circuit, SN7474N	25241
R37,45	Integrated Circuit, MC1806P	25733
R39,48	Integrated Circuit, SN15-846N	19716
W1-7,B-F	Jumper, Molded	102879

CHAPTER

CHAPTER 6
STANDARD OPTIONS

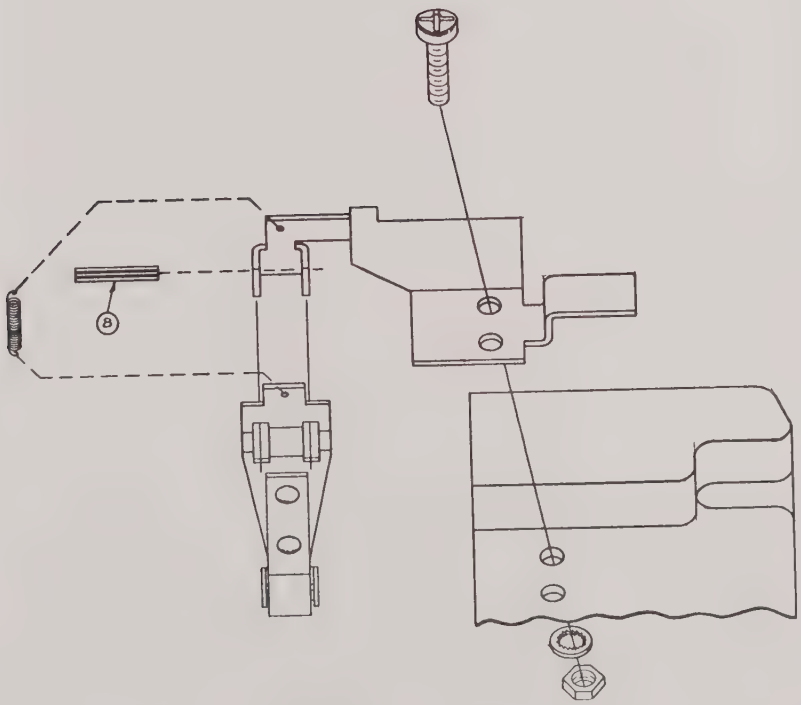
6.1 GENERAL

Standard Options available for the Model 5103B Digital Printer are described here. They include an internal power supply and column expansion cards. Connections are made as shown on the Block Diagram in Chapter 5.

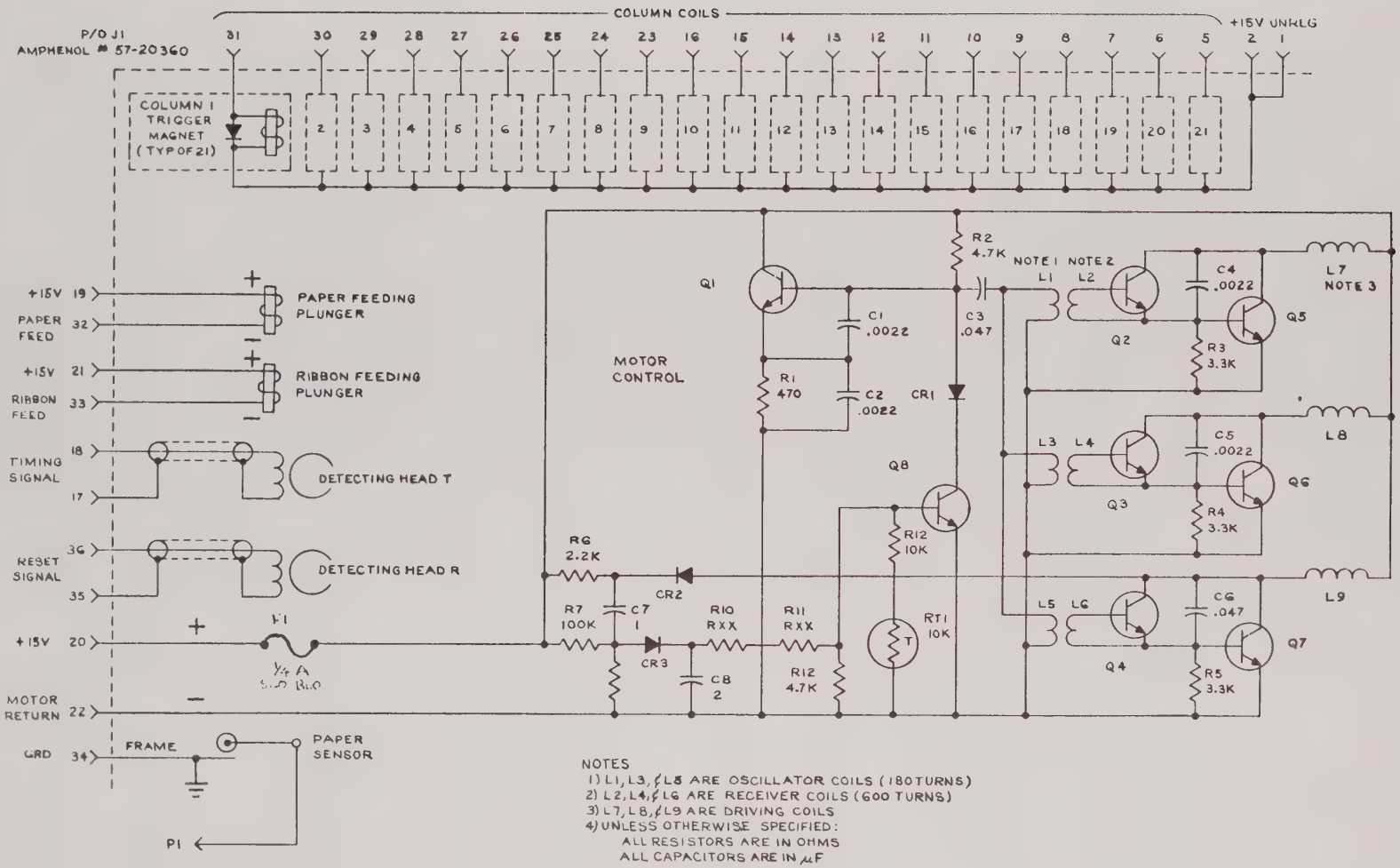
PARTS LIST

PRINTER MECHANISM #031545-7-1 REV B

REF.	DESCRIPTION	SD PART NO.
	Assembly	031545-4-1
	Schematic	031545-7-1
	Actuator	100965
	Spring Pin	100964
	Spring	100966
	Fuse, Mtg. Bracket Assy.	071425
	Hammer Lever Guide Bracket	100967



PRINTER MECHANISM ASSEMBLY #031545-4-1



NOTES
1) L1, L3, & L8 ARE OSCILLATOR COILS (180 TURNS)
2) L2, L4, & L6 ARE RECEIVER COILS (600 TURNS)
3) L7, L8, & L9 ARE DRIVING COILS
4) UNLESS OTHERWISE SPECIFIED:
ALL RESISTORS ARE IN OHMS
ALL CAPACITORS ARE IN μF

PRINTER MECHANISM SCHEMATIC #31545-7-1

CIRCUIT DESCRIPTION
A5, POWER SUPPLY
SCHEMATIC #51000-7

1) GENERAL

The power supply provides one regulated voltage (+5 V) and one non-regulated voltage (+15 V) for use within the instrument. Only the regulated +5 V is adjustable. It is protected by a fuse on the power supply assembly. Three additional nonregulated voltages (+21 V, -21 V, +9 V) and two regulated voltages (+15 V and -15 V) are developed for use within the power supply.

Input power at 115/230 V, 48 to 440 Hz is approximately 15 watts at nominal line while advancing paper at 15 spaces per second.

The input is fed to the transformer through fuse F1 and power switch S1. The third wire is grounded to the chassis.

The transformer is constructed with split-primary windings which are connected in parallel for 115 V operation and in series for 230 volt operation.

Three separate secondary windings are provided, one for ±21 V, one for +9 V and the third for the unregulated +15 V. The first two are provided with center taps.

2) NON-REGULATED SUPPLIES

The +15 V nonregulated supply is developed by full-wave rectifier CR7-CR8. The output is filtered by a capacitor mounted on the printer assembly.

The nonregulated +9 V is developed by full-wave rectifier CR5-CR6 and filtered by C3. It is rated at 1.5 A and provides the collector voltage for the +5 V series pass transistor, Q101.

A bridge rectifier formed from diodes CR1 through CR4,plus filter capacitors C1 and C2, develops the nonregulated +21 V and -21 V which are used as collector supplies for the +15 V and -15 V circuits, respectively. Each is rated at 100 mA.

3) REGULATED SUPPLIES

Pass transistors Q1 and Q2 establish +15 V and -15 V at the emitters of Q1 and Q2, respectively, under control of Zener diodes VR1 and VR2.

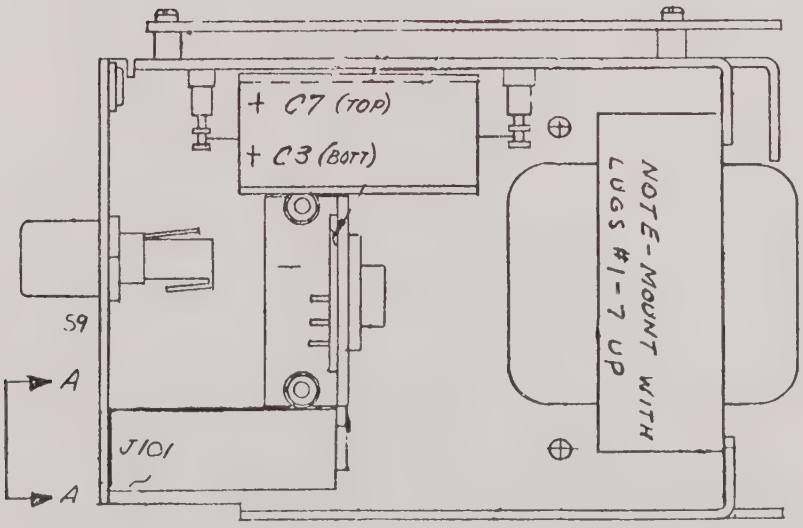
The regulated +5 V is established on the load side of F4. The regulator consists of a Zener reference diode (VR3) with voltage adjustment circuit (R4, R5, R6), a high-gain dc amplifier (U1) and a drive

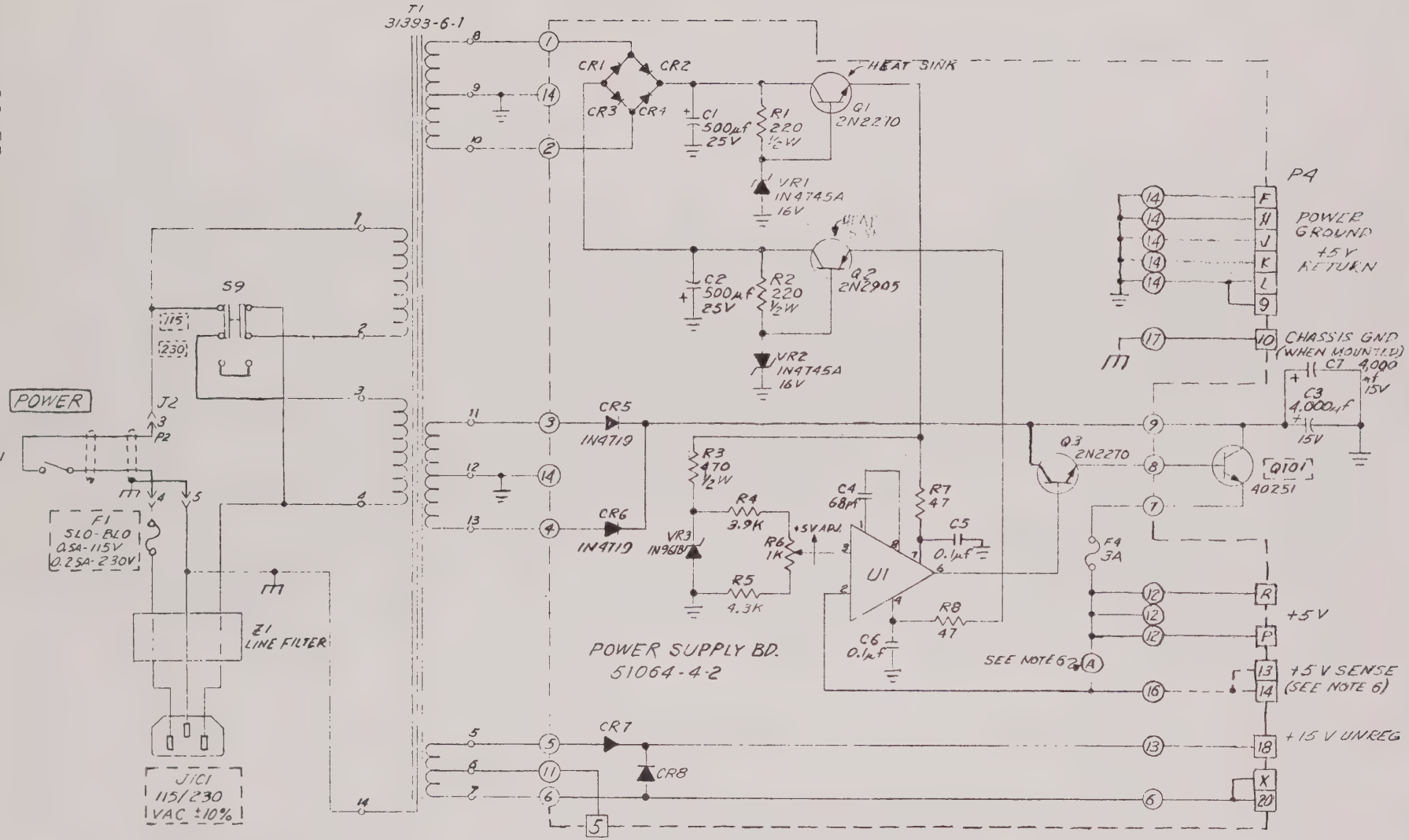
transistor (Q3) connected to the series pass transistor Q101 in a Darlington configuration. The total circuit has a closed-loop gain of unity. Fuse F4 is contained within the loop. Power for the reference circuit and dc amplifier is supplied by the regulated ±15 V circuits.

PARTS LIST

POWER SUPPLY #051000-7-3 REV D_1

REF.	DESCRIPTION	SD PART NO.
	Assembly, Power Supply	051000-4-3
	Assembly, P.C. Power Supply	051064-4-2
	Schematic	051000-7-3
C3,7	Capacitor, 4000 f, 15 V	100338
F1	Fuse, .5 A Slo Blo	100589
XF1	Fuse Post	102409
J101	Connector, Line Filter Power	102461
Q101	Transistor, 40251	101354
XQ101	Transistor Mounting Kit	100689
S9	Switch, Slide DPDT (115/230)	102331
T1	Transformer	031393-6-1
	Standoff, Insulated	100481
	Grommet, Heyco SB-750-9	100885





NOTES: (UNLESS OTHERWISE SPECIFIED)

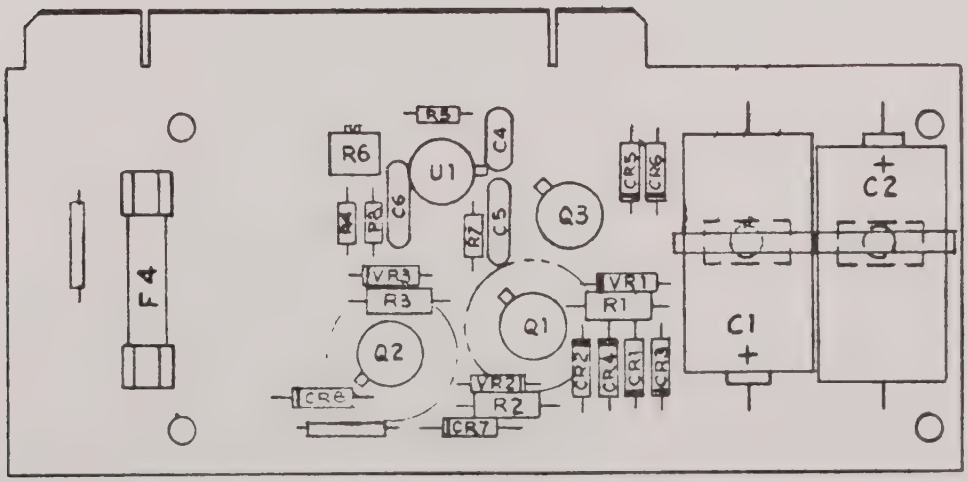
1. ALL DIODES ARE IN4005.
2. ALL RESISTORS ARE IN OHMS, ¼W, 5%.
3. U1 IS LM301A.
4. □ = EDGE CONNECTOR IF PROVIDED.
5. (N°) = PROVISION FOR WIRING TO BOARD.
6. (A) = PROVISION FOR +5V SENSE LINE IF REQ'D. REQUIREMENTS ARE TO DRILL OUT PLATING THRU OF PAD MARKED "A".

POWER SUPPLY SCHEMATIC #51000-7-3 REV H_1

PARTS LIST

A5, POWER SUPPLY REGULATOR #51064-7-2

REF.	DESCRIPTION	SD PART NO.
	Assembly	051064-4-2
	Schematic	051000-7-3
C1,2	Capacitor, 500 µF, 25 V, Elect	100296
C4	Capacitor, 68 pF	100239
C5,6	Capacitor, .1 µF, 50 V, Mono Chip	100178
CR1-4,7,8	Diode, 1N4005	100413
CR5,6	Diode, 1N4719, 50 V, 3A	100406
F4	Fuse, 3AG3A	100587
Q1,3	Transistor, 2N2270	101346
Q2	Transistor, 2N2905	101382
R1,2	Resistor, 220 Ω, 1/2 W, 5%	101667
R3	Resistor, 470 Ω, 1/2 W, 5%	101539
R4	Resistor, 3.9 k, 1/4 W, 5%	101601
R5	Resistor, 4.3 k, 1/4 W, 5%	101546
R6	Potentiometer, 1 k, 62PA Beckman	101893
R7,8	Resistor, 47 Ω, 1/4 W, 5%	101560
U1	Integrated Circuit, LM301A	025845
VR1,2	Diode, 1N4745A, 16 V	100431
VR3	Diode, 1N961B, 10 V	100395



CIRCUIT DESCRIPTION
A2,A3,A4, COLUMN EXPANSION
SCHEMATICS #51088-7-1 & #51084-7-2

1) GENERAL

Column expansion involves the addition of an Interconnect Board (Schematic #51088-7-1) and one or two Column Boards (Schematic #51084-7-2). The Interconnect Board provides the interface with the printer mechanism and the printer control circuitry (Schematics #31545-7-1 and #51228-7-2 in Chapter 5). Each Column Board mounts storage, decoding and drive circuits for seven columns. They mount into the P.C. connectors on the Interconnect Board as shown in Figure 6.1. Wiring to the Printer Mechanism and optional power supply is shown on Block Diagram #51097-7 in Chapter 5.

2) OPERATION

Operation of the expansion column circuits is identical to the Group #1 column circuits described in Section 5.2.2.

3) PROGRAMMING

Zero suppression programming is the same as described in Section 2.3.1. Group #2 (Board A2) columns are of higher significance than Group #1 (Board A1), and Group #3 (Board A3) columns are higher than Group #2.

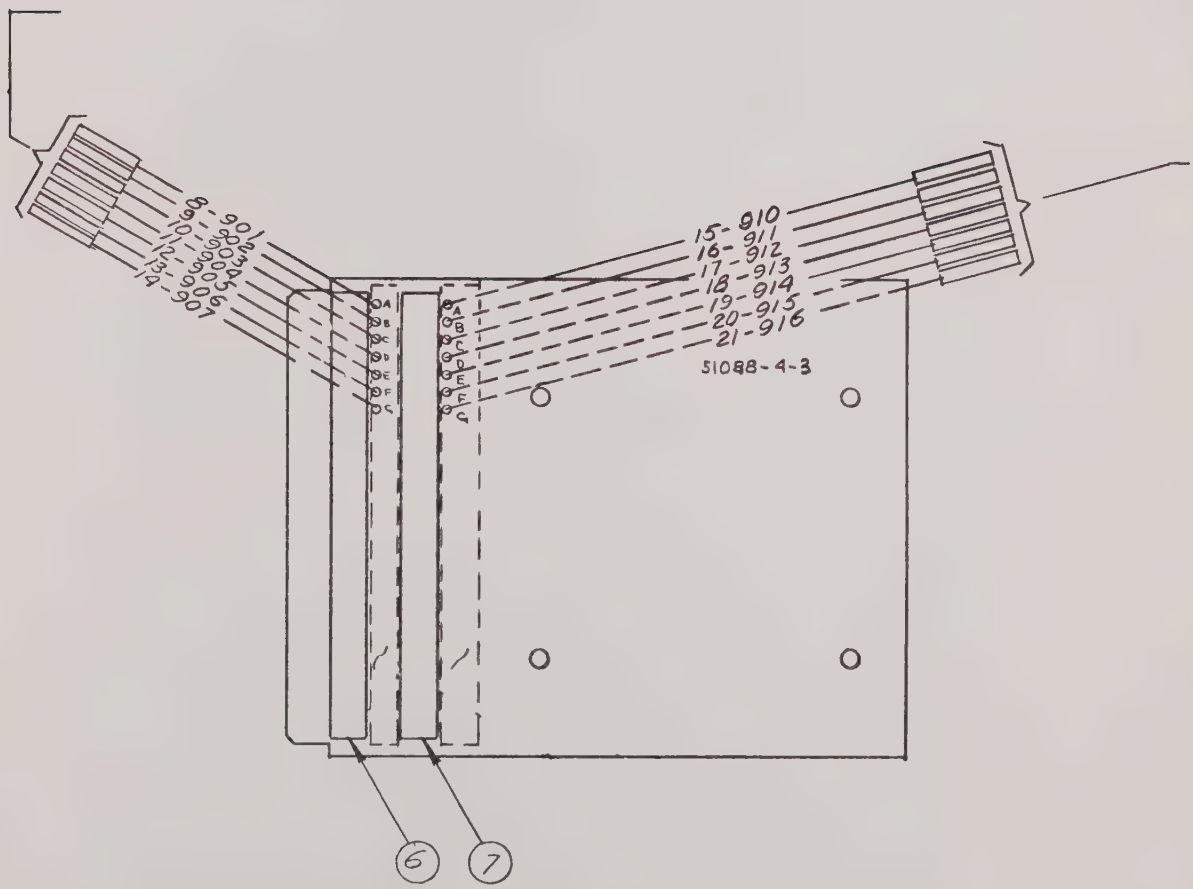
PARTS LIST

A4, INTERCONNECT BOARD #51088-7-1

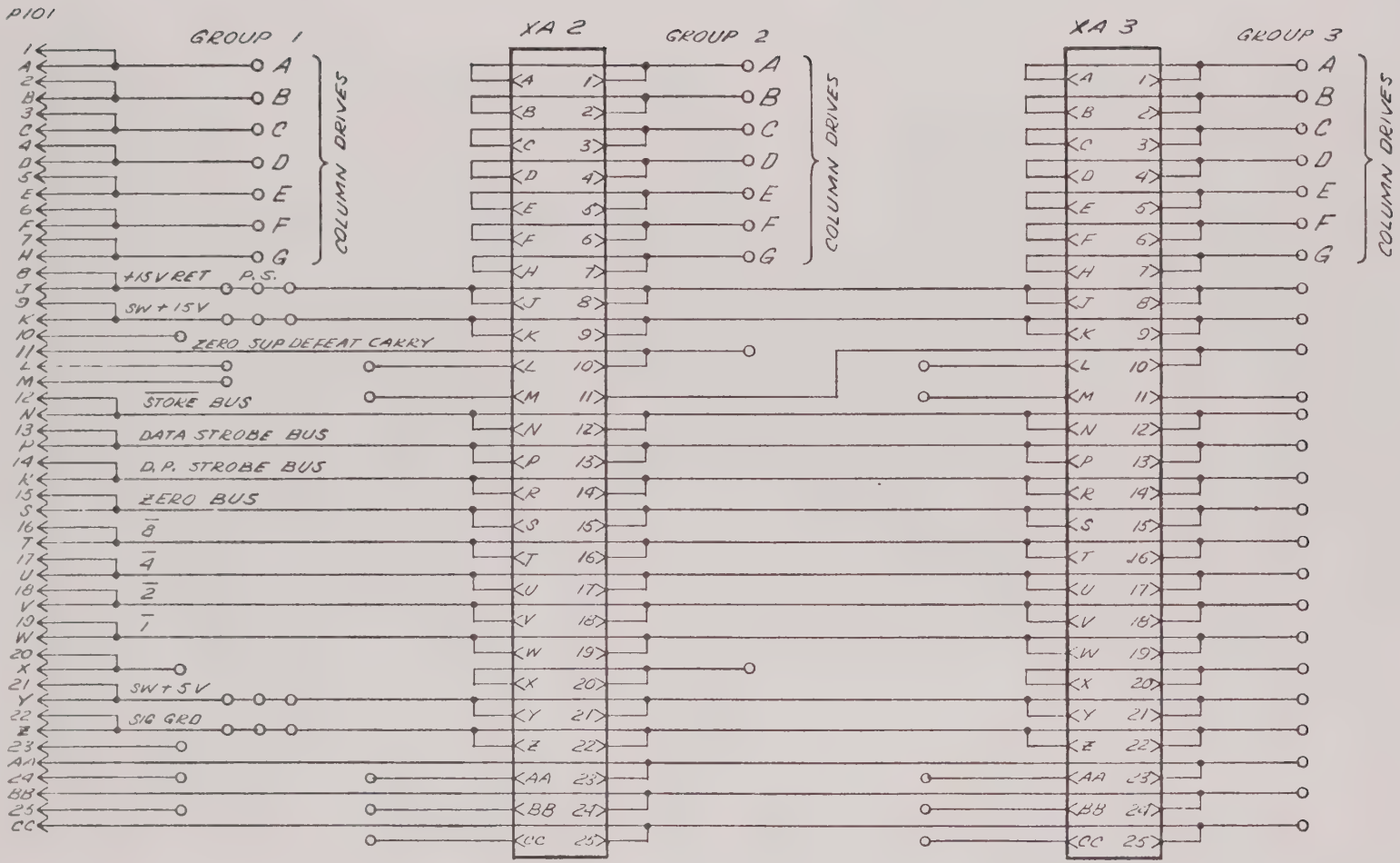
REF.	DESCRIPTION	SD PART NO.
	Assembly	051088-4-1
	Schematic	051088-7-1
XA2,3	Connector, 252-25-30-012	101239

GROUP #2
COLUMN PATCHCORDS

GROUP #3
COLUMN PATCHCORDS



P.C. CONNECTORS

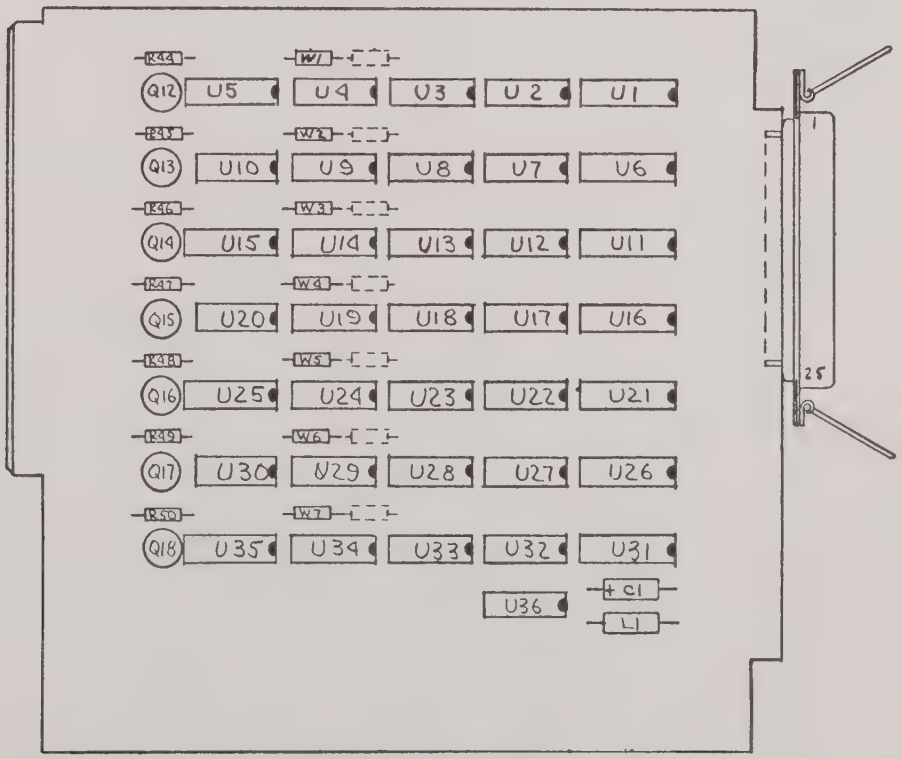


INTERCONNECT BOARD SCHEMATIC #51088-7-1

PARTS LIST

A2,A3, COLUMN BOARD #51084-7-2

REF.	DESCRIPTION	SD PART NO.
	Assembly	051084-4-2
	Schematic	051084-7-2
C1	Capacitor, 39 µF, 10 V, Tant	100183
L1	Inductor, R45-4	101313
Q12-18	Transistor, 2N3643	101358
R44-50	Resistor, 1 k, 1/4 W, 5%	101569
U1,5,6,11,15,16, 21,25,26,31,35	Integrated Circuit, SN74L75N	045201
U2,7,12,17,22,27,32	Integrated Circuit, MC1812P	25736
U3,8,13,18,23,28,33	Integrated Circuit, MC1810P	25735
U4,9,14,19,24,29,34	Integrated Circuit, MC862P	19719
U10,20,30	Integrated Circuit, MC836P	25704
U36	Integrated Circuit, MC857P	25753
J2	Connector, Amp 57-40500	101156



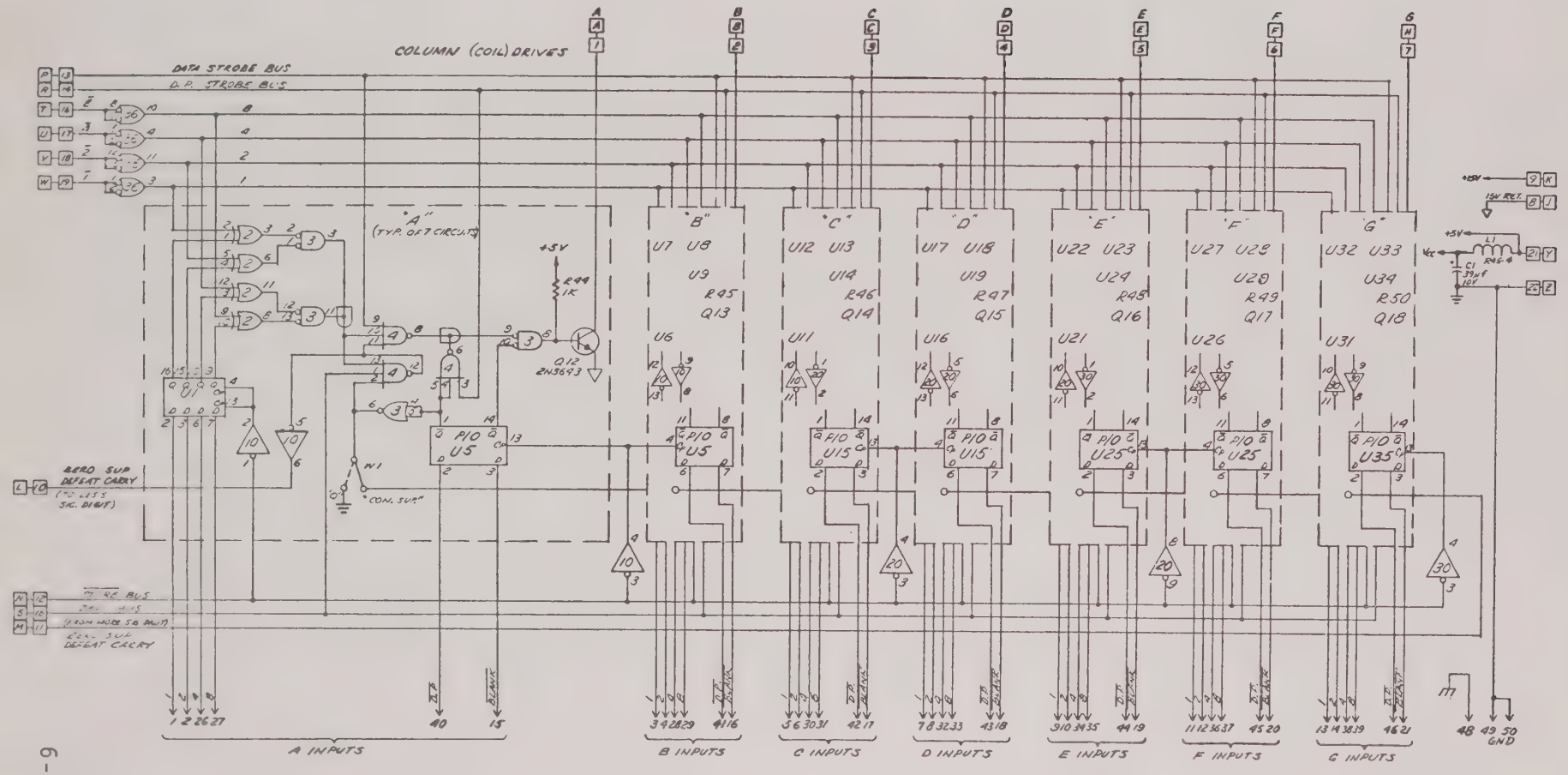
NOTES: UNLESS OTHERWISE NOTED;

1) a. ZERO SUPPRESSION PROGRAMMING.
JUMPER (W1) IS NORMALLY CONNECTED TO THE GROUND PAD "G" AS SHOWN. IN THIS STATE, ZEROS ARE PRINTED.
b. TO SUPPRESS ZEROS AT ALL TIMES, LIFT THE JUMPER FROM THE GRD. PAD.
c. TO MAKE THE PRINTING OF ZEROS CONDITIONAL ON WHETHER THE NEXT MORE SIGNIFICANT DIGIT IS PRINTED, LIFT THE JUMPER FROM THE GRD. PAD AND SOLDER TO THE CON SUP PAD

2) VCC CONNECTED TO PIN 14
GRD " " " 7
VCC CONNECTED TO PIN 5 SN74LS151N
GRD " " " 12 "

3) MC362P — U9, 9, 14, 19, 24, 29, 34.
MC236P — U10, 20, 30.
SN74LS74N — U1, 5, 6, 11, 15, 16, 21, 25, 26, 31, 35
MC631P — U8.
MC1812P — U2, 7, 12, 17, 22, 27, 32
MC1810P — U3, 8, 13, 18, 23, 28, 33.

4) LEGEND;
→ INPUT CONNECTOR J2 AMPH. 57-10500
⊣□ EDGE CONNECTOR P2.



COLUMN BOARD SCHEMATIC #51084-7-2 REV A

CHAPTER 7
SPECIAL MODIFICATIONS

7.1 GENERAL

Modifications to the Model 5103B, requested by the customer, are documented in this chapter. These are usually extra-cost items to tailor the unit for a specific application.

MP MASTER
MA33955